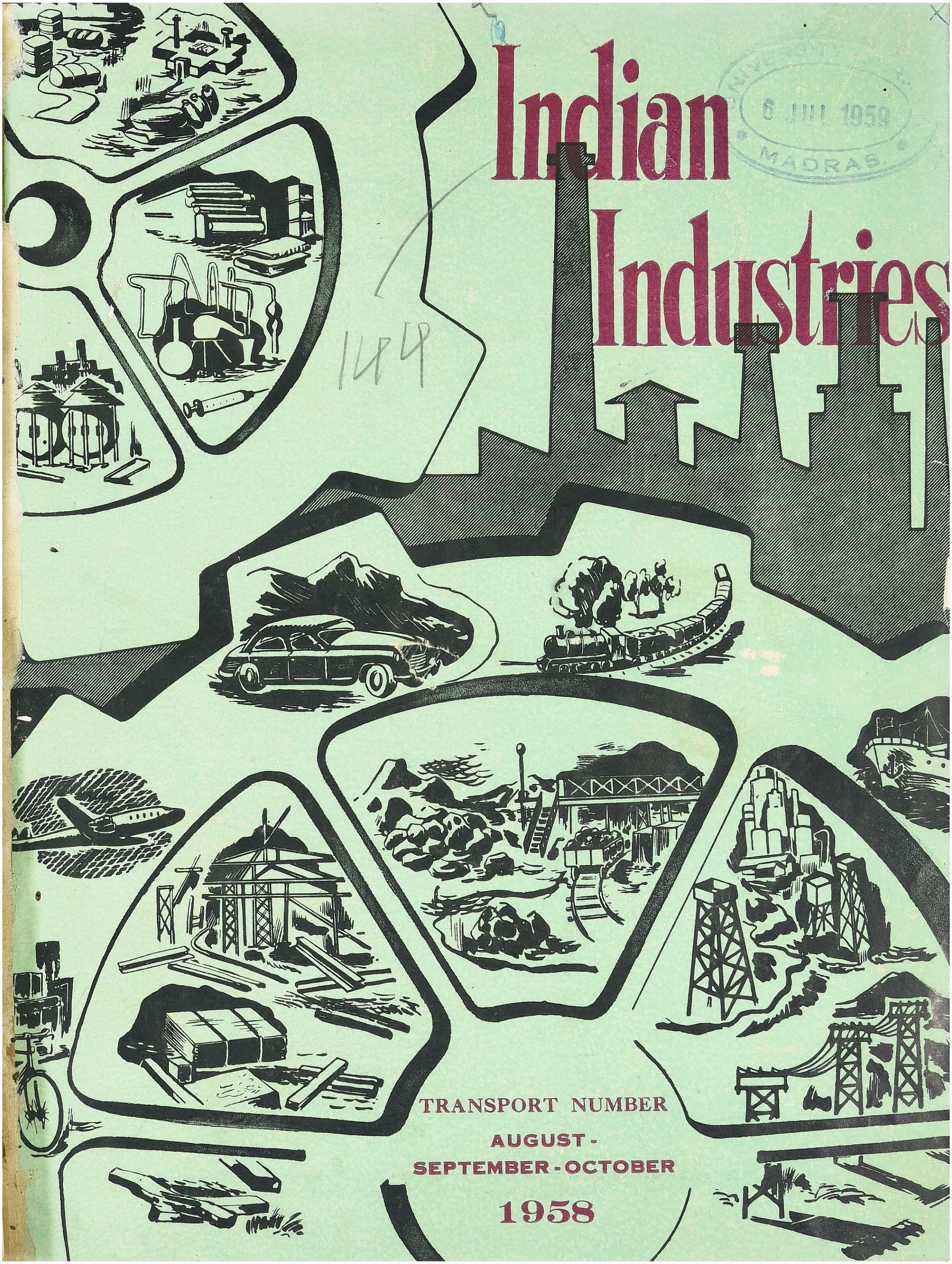

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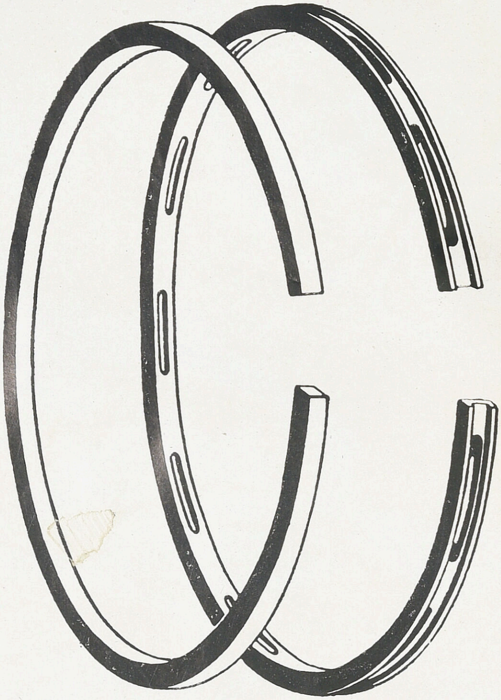

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CONTENTS

	Page
Transport Industries — Krishna Srinivas ...	3
Road Transport — R. L. Gupta ...	4A
Telco in Transport — R. G. da Costa ...	6
Battery Industry — H. R. Gregson ...	11
Paint Industry — G. H. Gates-Reed ...	15
Indian Railways — S. V. Ramaswamy ...	19
Automobile Industry — Manubhai Shah ...	21
Bicycle Industry — A. M. M. Arunachalam ...	26
Automotive Two-Wheeler Industry — S. R. Subramaniam ...	29
Leaf Springs Industry ...	32
Indian Shipping — Raj Bahadur ...	33
Natural Gas in Jwalamukhi ...	40
Transport and A. E. I. ...	41
Piston Rings ...	46
Rubber ...	48

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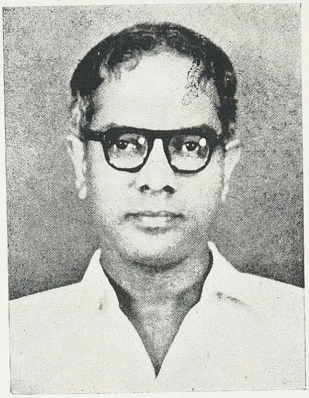

TRANSPORT INDUSTRIES

In our Second Five Year Plan, the allocation for transport is nearly twice that for industry and mining. Our next plan must be more concentrated on roads, harbours and railways. The accent on industrialisation being stronger, transport facilities have to be expanded heavily. Twenty nine percent of the Second Plan outlay has been set aside for transport—Rs. 900 crores for the expansion of railways, Rs. 271 crores for new roads, more road transport and for encouraging tourism, Rs. 48 crores for expansion of shipping and Rs. 43 crores for developing civil air transport and Rs. 76 crores for communication and broadcasting.

By 1961, the production of locomotives, wagons and coaches will reach to the level of 400 : 25,000 and 1800 per annum respectively. National highways will increase by seven per cent and surfaced roads by seventeen per cent. The shipping tonnage on coastal trade would be increased from 3.2 lakh G. R. T. to 4.3 G. R. T. and on overseas trade from 2.8 lakh G. R. T. to 4.7 lakh G. R. T. Our ports will handle about 32.5 million tons, an increase of 7.5 million tons.

The following table bears eloquent testimony to the great progress of transport industries :

	Production in 1947	Production in 1957
Automobiles	Nil	35,000
Bicycles	49,000	6,95,000
Diesel Engines	700	18,000
Storage Batteries	70,000	3,20,000

A close study of the fine articles in this issue by eminent specialists on transport will convince the reader of what a great future awaits our roads, railways and shipping.

Shri Gupta writes on Road Transport with authority and vision.

Mr. da Costa gives an excellent account of TELCO, with all his wealth of ideas and experiences.

Mr. Gregson's analysis of Battery industry is exquisite.

Mr. Gates Reed lifts us to giddy horizons, strange dyes, strange colours.

Our popular Minister Manubhai Shah, a perfect artist in perfect thoughts, chooses facts as the jeweller chooses his gems.

Shipping Minister Shri Raj Bahadur powerfully pleads for the sailing of our ships in vaster seas and shores forlorn.

Railways in India are a world in itself and our Railway Deputy Minister gives an ecstatic account of their spectacular development and the tasks ahead.

The leading industrialists of South India Shri Arunachalam and Shri Subramaniam give admirable pictures of the future that await the two wheelers.

About Piston Rings produced by Goetse India, a fine account appears in this issue. A. E. I. 's part in Transport is well sketched.

Transport, sending out its roots into the veins of half a million villages, the haunting hum of automobiles, locomotives and planes will grow ubiquitous and that spells prosperity to millions. Agriculture—providing occupation to over thirty millions—will claim a greater share of allocations : more roads, more tractors, more wealth.

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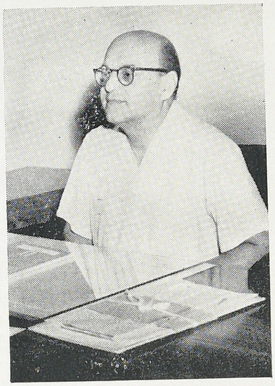

In this illuminating article the learned author solves many of the problems of road transport.

ROAD TRANSPORT IN INDIA

R. L. GUPTA

Transport Secretary, Government of India, New Delhi

The mainstay of transportation in India for over a century and a half has been the railway system and the development of the railways has occupied a central place in Indian development plans. The impact of war, and the technological development that went with it and has followed with even greater speed, has had its effect on India as on other countries. We are no longer a vast sub-continent slumbering in its latent glory, but a country fully conscious of its role in the struggle for survival. The large-scale planning for industrial development is symptomatic of this new thinking, but for industrial expansion to be possible, fullest development of the transport facilities is essential. This development can no longer be confined to the railways. Inland water transport and coastal shipping must take their share in providing relief to the railways. However, by far the greatest part in improving the transport capacity of the country can be played by road transport. It has already given proof in recent years of its ability to expand quickly.

At the beginning of the First Five Year Plan, *i.e.*, on the 1st April 1951, India had 98,000 miles of metalled roads and 151,000 miles of unmetalled roads. By the end of the First Plan period the length of the roads increased to 122,000 miles metalled and 160,000 unmetalled. The cost involved was about £ 120 millions. Even with this expansion, we are far behind western countries and the U.S. as this table shows.

Country	Road mileage in thousands	Population in thousands 1954 Estimate	Area in sq. mile	Average road mileage per lakh of population	Average road mileage per sq. mile of area
India	282	37,70,00	12,66,900	74.84	0.22
Great Britain	188	5,10,59	94,214	374.49	2.00
Switzerland	29	49,23	15,918	593.30	1.83
Belgium	27	88,19	11,778	310 10	2.32
France	646	43,000	2,12,840	1,503.10	3.04
U. S. A.	3,030	1,62,409	30,22,389	1,865.70	1.00

By the end of the Second Five Year Plan, we expect to push up our road mileage to 144,000 metalled and 238,000 non-metalled at an approximate cost of £ 200 millions. This target will bring the road system to the level where no village in a well-developed area

would be more than five miles from a main road and in an undeveloped area 20 miles from a main road. Even such a development will be very modest. The costs involved are so high that it is practically impossible to go faster. For instance, if we were to set an objective of bringing every village in a developed agricultural area within three miles from a main road, nine miles in semi-developed or forest area and 20 miles in undeveloped areas, it is roughly estimated that we would require 320,000 miles of metalled and 288,000 miles of unmetalled roads, and the cost would mount to over £ 3,000 millions, and even then the average road mileage per square mile of area will only rise to 0.48 from the present average of 0.22. This shows the enormity of the problem.

Limited as our resources are, our current road development programme envisages the construction of 12 feet of single-lane roads mainly, whereas no road designed for fast traffic should have less than 22 feet width so as to permit two-lane traffic. Even on our national highways, the aggregate length of which today is about 13,800 miles, only 800 miles have a two-lane carriageway. At the end of the Second Plan period this is expected to increase to about 2,600 miles. However, certain major river crossings will still remain to be constructed.

At the beginning of the First Five Year Plan we started with 80,000 to 90,000 goods vehicles and about 35,000 passenger vehicles. It was estimated that to meet the demand created by the First Plan an all-round increase of 30 percent over the transport capacity would be necessary. In the sphere of road transport our development has far exceeded that target so that today we have nearly 120,000 goods vehicles and about 50,000 stage carriages. This has increased the goods carrying capacity from 8-10 million tons to 18-20 million tons. Yet it is found to be quite inadequate. It is now realised that we have not only to expand the capacity of road transport to meet the normal expansion of demand in this sphere but also to provide for the gap that well be left by the railways not being able to expand their capacity to the desired limit. To carry 70 million tons more we require a minimum number of 300,000 vehicles costing roughly £ 750 million!

These sums are too large to plan for in five years but a good deal can be done by improving the efficiency and the organisation of the industry. The out-turn of the vehicles today is much below their capacity. In certain areas the utilisation ratio is as low as 40 percent. The cause of this under-utilisation is the lack of organisation in the industry. One-vehicle operators, who abound in the industry, spend half their time in looking for customers. There is also cut-throat competition amongst them. This results in the vehicles being idle for more than half the time and also the trade is reluctant to utilise road services until they have been organised on an efficient and reliabe basis.

The urgency of organising road transport on sound lines was realised as early as 1946 when in a White Paper issued by Government it was declared as Governmet policy to consolidate road transport in bigger units. Government themselves demonstrated the advantages of viable units by means of the large nationalised passenger transport undertakings which have been set up in various States and in big cities.

Another method of increasing our road transport is to employ truck-trailer and tractor-trailer combinations. At preseni trailers are operating in very small numbers and only in certain big trading centres. On the highways the use of the trailers is almost unknown. This is mainly due to the absence of large trucking units and organised operations on intra-State or inter-State routes. As the policy of the Government is to encourage the formation of viable units, increased utilisation of trailers with goods carriers will become not only a probability but a certainty. In the Second Plan period 50,000 to 60,000 trailers will be brought into use.

The bullock is a kind of multipurpose machine on which the economy of Indian agriculture depends very substantially. His utilisation for transport purposes is economical. It has been estimated that a cart with wheels having proper bearings, can carry 2½ times its normal load on good roads.

In a large country like India the road transport problem is large in dimension and in cost. Achievement of western standards is outside our present limited resources but it is quite reasonable to hope that in few years road transport will become an important, adequate, competitive but complementary service to the railway system in India.

* * *

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Magnificent is the part played by Tatas in transport. Telco saves Rs. 15 crores of foreign exchange every year.

TELCO IN TRANSPORT

R. G. da COSTA

General Manager, Tata Locomotive & Engineering Co. Ltd., Jamshedpur

The Tata Locomotive & Engineering Co. Ltd., (Telco for short) was established in 1945 to manufacture locomotives and other heavy engineering products. Telco is to-day divided into three main Divisions : Locomotive, Automobile and Foundry. And it is playing a major role in helping to relieve one of the country's biggest bottlenecks—transport.

Until now Telco's contribution to the country's transport is :—

Locomotives of two types	340
Spare locomotive boilers of nine different types	354
Steam Road Rollers	950
Carriage Underframes	2,000
Truck and bus chassis	20,000

Telco has turned out to-date approximately Rs. 60 crores worth of goods and saved the country approximately Rs. 30 crores of foreign exchange. In the course of the next year or two Telco will save the country annually about Rs. 15 crores of foreign exchange.

Locomotive Division

Towards the end of the War there was a great demand for locomotives in India. Imports had dwindled down to a mere trickle and the Indian Railways had accumulated abnormally heavy arrears of renewals and replacements of locomotives and boilers. A substantial number of locomotives had been shipped overseas for work. It was under these circumstances that despite the obvious difficulties and handicaps which would face the establishment of a new locomotive industry the Government of India and the Tatas negotiated an Agreement for the manufacture of locomotives and

boilers in the Singhbhum Shops of the East Indian Railway at Tatanagar. To manufacture locomotives the Singhbhum Shops had to be dismantled and new Shops had to be built almost on the same site. The work of dismantling an old factory, putting up a new one and carrying on production and all at the same time and on the same site gave rise to many formidable difficulties. Another great handicap was the fact that there were very few men available in the country who have had experience in locomotive building work.

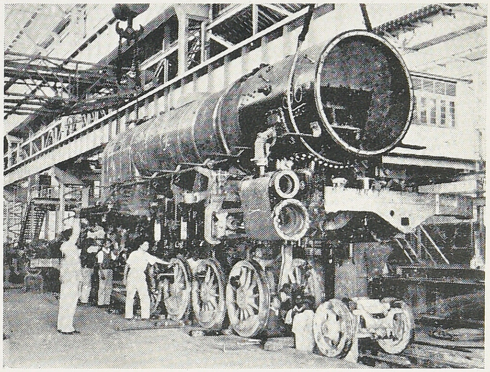
To help get established as quickly as possible Telco had to seek aid from abroad. So in 1951 it made a Technical Aid Agreement with an old established Locomotive works in Germany, Messrs Krauss-Maffei of Munich. Telco's young technicians were sent over to study various aspects of locomotive engineering in the Munich Works and German engineers came over to Telco. The Telco technicians have all come home and almost all the German engineers from Krauss-Maffei have gone back to their own country. And locomotive manufacture became properly established and in a very short time. But this was not all. The country needed more and more transport. So a further expansion programme was launched to step up Telco's output to at least 100 locomotives a year. Telco has already achieved this target.

The construction phase of the Locomotive Shops was completed in 1951 and locomotive production began early in 1952. Within two and a half years the target production of 50 locomotives and 50 spare boilers per year with 75 per cent indigenous content was reached. This was no mean achievement, especially as the Company had to start from scratch and overcome many serious difficulties.

The important thing to remember is that Telco locomotive prices in the early stages from being high have in a short space of time fallen so steeply that they are now substantially lower than that of unsubsidised imported locomotives. When a new industry is established the early prices are always very high—but there are very few industries anywhere whose prices have dropped so steeply and so quickly as in the case of Telco.

Automobile Division

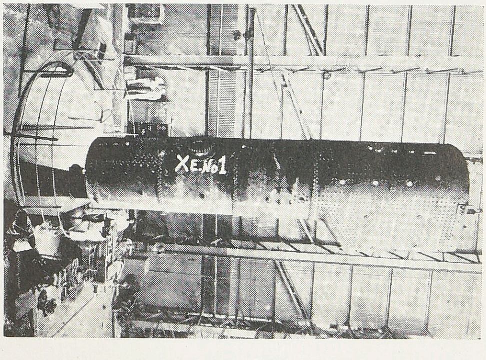
1954 will stand out in Telco's history. It heralded the close association of two great Companies: Daimler-Benz of Germany and the House of Tatas. The name Daimler-Benz is famous throughout the world. This Company turns out the finest high quality products. Almost every major motor car race in the post-war world in which Daimler-Benz participated has been won by the famous Mercedes-Benz quality cars.



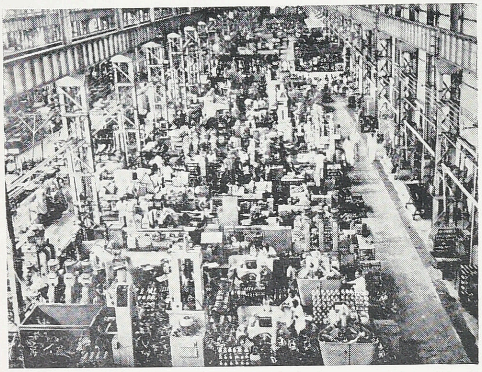
Locomotive being lowered on to its wheels

Telco's Agreement with Daimler-Benz—and Telco is indeed very proud of its association with this famous firm—is for 15 years. It is not only an Agreement for the closest co-operation and technical aid in every direction, but Daimler-Benz is much more than an association-it is virtually a marriage of two great Companies.

Right from the start everything went at top speed. By the end of this year well over

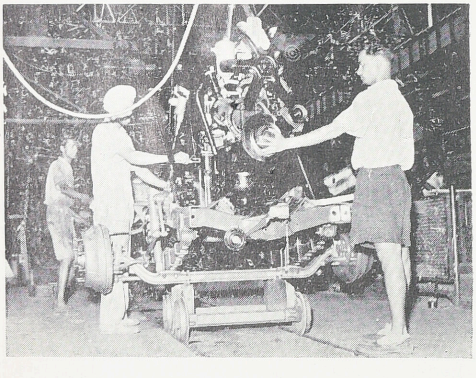


Boiler being rivetted on a Deep Gap Rivetter



A view of the Automobile Machine Shop

22,000 truck and bus chassis will have left the Assembly Lines. The increasing tempo of industrial expansion in the country as well as the big demand for the magnificent Tata-Mercedes-Benz truck and bus chassis have caused a complete change in our former plans. The original plan was to make 3,000 truck bus chassis a year. Then it was decided to double the Automobile Plant and the planning was for 6,000 units a year. But the extremely high quality of our products is giving rise to a demand for them which just cannot be satisfied. So who knows—in the future and possibly in the near future at that—this already considerable output might yet to be doubled and yet doubled again.



Engine being mounted on to a frame in the Auto Assembly Shop

Automobile manufacture in Telco has been divided into four yearly stages. During each of these stages more and more components and parts are being progressively manufactured in Telco. Telco is now at the end of the second stage. The main items of work yet to be done in Telco on Tata-Mercedes-Benz truck and bus chassis are the Gear Box and the Engine which are being imported at the present time. The Gear Box will be manufactured in the third stage which starts from May 1958. And the last stage—the manufacture of the Engine—will begin in about October, 1958. By the middle of 1959 the Tata-Mercedes-Benz truck and bus chassis leaving Telco will be almost entirely Indian made except for a few patented and specialised parts which will have to be imported from abroad.

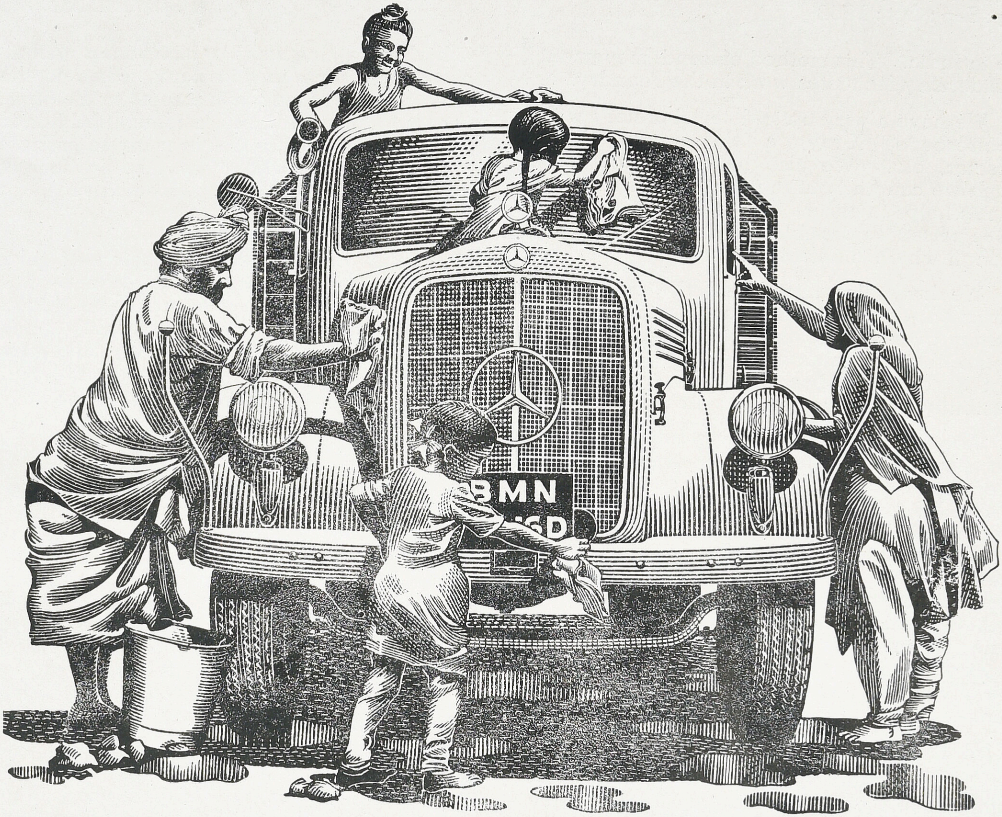
Foundry Division

Most engineering products require castings. And one of the Country's acute shortages at the present time is high quality steel castings—crores of rupees worth are imported into India every year. And that is the main justification for the big mechanised Steel Foundry that has just been completed at Telco. Trucks and buses also require a large number of intricate alloy iron castings—a completely mechanised Alloy Iron Fundry is fast nearing completion to meet this need. These Foundries will provide castings not only for Telco's locomotives and truck and bus chassis but some of the Chittaranjan Locomotive Works' needs of foundry products and other requirements of castings in this country will also be met by Telco.

Telco's Foundries are modern and completely mechanised: there is quality control of sand—a technique which does not exist in India at the present time to anything like the extent which we have in Telco. There is also detailed quality control of all the raw materials that go towards making a casting.

For a Foundry, layout is important: for one ton of finished casting there's more than 200 tons of movement—can you imagine it? That's why layout is so important. And Telco's layout compares well with that of the finest modern Foundries anywhere in the world.

In a Foundry there is considerable movement of sand: in the Telco Foundry all sand movement is through pneumatic pipe conveyors. This is done only in the most up-to date Foundries abroad, and it is not done anywhere



The Breadwinner of the family

Everyone in the family joyfully lends a helping hand as Harbans Singh cleans and polishes his TATA-MERCEDES-BENZ truck at the end of the day.

Bought over three years ago, this TATA-MERCEDES-BENZ truck has hauled freight over 1,80,000 miles without trouble or breakdown. Its rugged construction and trouble-free service have added to its economy in operation.

Transport by TATA-MERCEDES-BENZ trucks costs less per freight-mile because their engines give maximum mileage and extra years of service. The specially designed chassis frame carries heavy freight safely over the roughest roads.

Transport operators all over India are discovering a reliable source of livelihood in TATA-MERCEDES-BENZ trucks.

TATA-MERCEDES-BENZ

TATA LOCOMOTIVE & ENGINEERING COMPANY LIMITED
Automobile Division:
148, Mahatma Gandhi Road, Bombay-1.

TELCO. 58.8A EVEREST

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else in India. This method of sand movement considerably facilitates work in the Foundry.

We have a very up-to-date laboratory with Spectroscope, X-ray, a Supersonic Crack Detector, etc. We also have a process by which we can find out the gas analysis in steel. All this helps to ensure that the Telco castings are as perfect as possible and that nothing goes through which is defective.

We have also introduced the latest dust extraction equipment in our Foundry Shops costing over Rs. 10 lakhs. This will help to ensure that the atmosphere in the Shops is kept as clean as possible and eliminates any possibility of the dreadful disease Silicosis.

Again, as for locomotives and truck and bus chassis, the pattern is the same: to help us establish the manufacture of steel castings as quickly as possible we have linked up with a well-known foreign firm—this time with a firm in Belgium, Messrs. Usines Emile Henricot, one of the world's leading steel Founders. Our own technicians have been sent to Belgium for further training and Belgian engineers have come to us. And by this means we have acquired the complicated and difficult technique of Foundry practice in the least possible time.

Telco Employees and Training

Telco started off in 1945 with a total number of employees of less than 1,000; at the present time there are about 8500 employees in Telco.

The earnings of Telco workers are amongst the highest in the country.

A great majority of the present 4,000 skilled workers of Telco were trained by Telco itself. Telco's apprentice training has been organised on very modern European standards. It's a three-year course: and every year 100 skilled men are turned out by the Apprentice School after passing them through a very thorough theoretical and practical curriculum. The training is very good; there is an interesting system of documentation by which the progress of the Apprentices is watched stage by stage. The Telco Apprentices also have some of the most modern machine tools to train on. This is something very new in India where most Apprentice Schools have old and worn out machine tools for training purposes. After their course the Telco Apprentices are as good as any skilled workmen anywhere in the world.

For higher training some of our young technicians were sent to Germany, some to the United States of America and some to Belgium. In order to help build up a family tradition in Telco we try to ensure that as many as possible of the Apprentices whom we take are sons or very close relations of our own employees.

Housing

In the housing of its employees Telco stands high among industrial enterprises. The Telco town is built with modern ideas of town planning and design: it is beautifully landscaped and situated in undulating land interspersed with trees. Telco has already built more than 3,000 houses for its employees. ***

★ ★ ★ ★ ★ ★ ★ ★ ★

The visit to India of Mr. Peter C. Aspinall, Export Manager of Chloride Batteries Ltd., London, the U. K. Associates of Chloride and Exide Batteries (Eastern) Private Ltd., Calcutta, has aroused much interest in trade circles. It will be recalled that Mr. Aspinall's last visit to this country in 1955 was followed by the introduction of the now well-known Silver Exide Battery.

A widely travelled man, P. C. Aspinall joined the R. A. F. during the last war when he was barely twenty. After serving in the United States and in the European theatre with Bomber Command, he was posted to Burma and the Far Eastern Air Command. On many occasions he flew Admiral Viscount Mountbatten of Burma, then the Supreme Commander of the South East Asia forces.

Mr. Aspinall joined Chloride Batteries Ltd., in 1947. He was appointed Assistant Export Manager of the Company in 1956, becoming the Export Manager shortly after.

In course of his present visit to India, Mr. Aspinall has also held discussions with Government officials on plans for the expansion of Exide's factory in India, believed to be the best equipped battery factory in Asia, and also on questions of export promotion.

Mr. Aspinall left India towards the end of July to visit South East Asian countries and is expected to return in August. ***

★ ★ ★ ★ ★ ★ ★ ★ ★ ★

This industry is playing a vital part in the Indian economy and Mr. Gregson gives an excellent account.

BATTERY INDUSTRY

H. R. GREGSON

Managing Director, Chloride & Exide Batteries (Eastern) Private Ltd., Calcutta

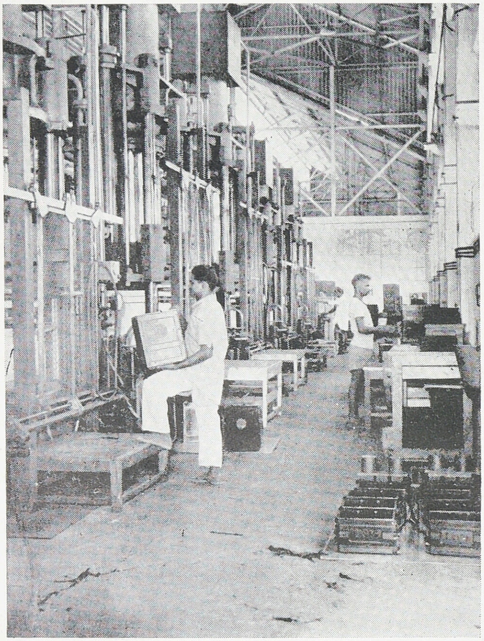
The pace of industrial growth in India over the past few years has been very great, although it is often considered to be insufficient by those who are not at the practical end of the many difficulties involved. The group of industries which has shown the most outstanding advance is that comprising the light electrical industries including lamps, fans, radio sets and batteries. The value of their production has increased from Rs. 5 crores in 1948 to the very formidable figure of Rs. 25 crores in the current year. As the Second Plan target figure is an annual output worth about Rs. 40 crores this does not seem to be a target that will present great difficulties in view of the really formidable past performance.

Among these light electrical industries, that responsible for Storage Battery manufacture in India has played its full part, not only in a major increase in output but also in a great diversification of the types and categories of Storage Batteries produced. In plain dull figures, output has increased from 187,000 batteries in 1950 to 314,500 in 1956 and this increase continues.

The lay reader or user of a storage battery usually thinks in terms of Starter Batteries as used in motor vehicles, but the requirements of a progressive industrial country call for a much wider range of batteries. Indeed, to-day, the storage battery is completely ubiquitous in all forms of transport and tele-communications and also in the distribution of electrical power over the various grid schemes and at the more detailed distributing stage.

Storage batteries start up your aircraft, and also are used in the air for lighting and various duties. On your passenger trains, whether they be of the normal steam or diesel loco-drawn type, or on the newer electrified Railway stock, the storage battery is there to provide unfailing light and power for fans and other equipment during the long main line journeys involved on the Indian Railways, one of the world's largest integrated systems. In power stations and sub-stations for the supply and distribution of electrical power, there are large Stationary Accumulators for the unfailing operation of switchgear or to see the power station or sub-station through periods of emergency.

Storage batteries are also in considerable demand for emergency power duties in many factories, where it is essential to avoid a break in process work, notable examples being the largest glass-producing factory in India and also one of the largest producers of fine paper where a break in process would involve a most costly loss. In cars, trucks, tractors, earth moving machines, motor cycles, scooters, mobile cranes, launches, diesel locomotives, diesel stationary engines and in fact, for virtually all combustion engine equipment,



A section of the Press Room at the Exide factory where hard rubber containers are manufactured

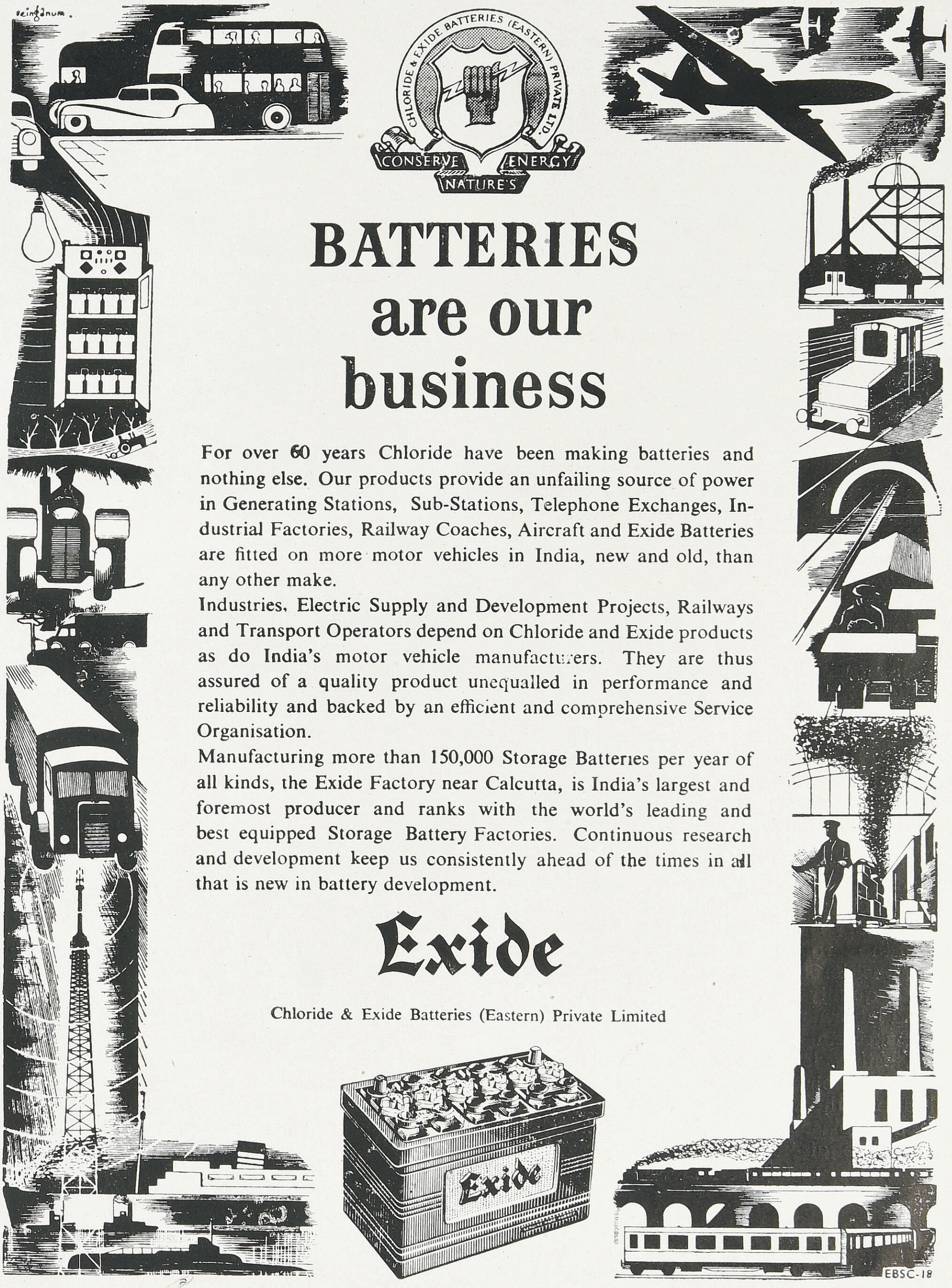
particularly of the mobile kind, the starter battery is an essential equipment. This wide range of use calls for a great variety of batteries, many of the heavy duty type, to withstand the very arduous conditions of these services, particularly in India, where conditions of high temperature, dust, rough roads, or rough conditions on new projects, have all got to be met.

The industry built itself on the manufacture of starter batteries for motor vehicles with one or two small units established in the pre-war years. War shortages stressed the increased requirement for added manufacture, and towards the end of the war, one or two large units became established, notably in Calcutta and Bombay, the former with an emphasis on Defence requirements. Thus, from a small beginning in the 1946 period, the country rapidly became self-sufficient regarding motor vehicle batteries. The industry was given a protective duty of 80 per cent for some years but it is worth recording that no advantage was taken of this as price levies were maintained at rates competitive with those prevailing in other unprotected nearby markets. The Indian produced battery also compared favourably in price with those in the large U.K. or Continental markets. The protection period did, however, give a real impetus to manufacturers to increase their scale of manufacture and also to further their self-sufficiency.

The two largest units also took steps to widen their range of manufactures and thereby to reduce the imports of other types of batteries, particularly for the large requirement for Train Lighting Batteries, and over the past few years, as a result of considerable investment by the units concerned, there has been a very major saving in foreign exchange previously spent on complete imported batteries for these special purposes.

One well-known factory which manufactures types of cells previously made at their associated U. K. factories has alone so effected a foreign exchange saving of over Rs. 2 crores over the last few years, by these developments. The need for Stationary Accumulators using pure lead positive plates of the Plante type has also engaged the attention of leading manufacturers and progressive development is under way. These batteries which must comply with British Standard Specifications and also those issued by the Indian Posts and Telegraphs Department, require most careful manufacture as correctly made plates give life of 10 to 25 years depending upon the type of service involved. The average reader probably does not realise that every time he lifts up his telephone, a storage battery is in the background in the exchange providing the electrical current required for the call which is being made. Furthermore, these batteries enable the telephone exchanges to carry on in times of power failure. Thus, essential urgent calls are not affected by such mains failures. Special batteries for the groundstarting of aircraft and for special defence telecommunications and signals purposes are also being developed by various manufacturers and many of these are now being made completely in India.

The Indian industry has also to meet the new designs required by the automobile manufacturers, who obtain all their requirements of original equipment batteries in the country.


CHLORIDE & EXIDE BATTERIES (EASTERN) PRIVATE LTD.
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BATTERIES are our business
For over 60 years Chloride have been making batteries and nothing else. Our products provide an unfailing source of power in Generating Stations, Sub-Stations, Telephone Exchanges, Industrial Factories, Railway Coaches, Aircraft and Exide Batteries are fitted on more motor vehicles in India, new and old, than any other make.
Industries, Electric Supply and Development Projects, Railways and Transport Operators depend on Chloride and Exide products as do India's motor vehicle manufacturers. They are thus assured of a quality product unequalled in performance and reliability and backed by an efficient and comprehensive Service Organisation.
Manufacturing more than 150,000 Storage Batteries per year of all kinds, the Exide Factory near Calcutta, is India's largest and foremost producer and ranks with the world's leading and best equipped Storage Battery Factories. Continuous research and development keep us consistently ahead of the times in all that is new in battery development.
Exide
Chloride & Exide Batteries (Eastern) Private Limited
Exide
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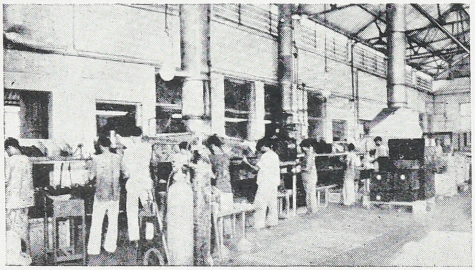


Assembling Train-Lighting Cells at the Exide factory

There are in the country some fifteen approved battery manufacturers, who come under the scope of the Industries Developments and Regulations Act 1951 and among these are one or two units with first class factories comparable with the best in Europe, America, or in any advanced industrial country. The smaller units are also showing a good progress and many have their particular fields of outlet. There is plenty of competition which is a good thing and encourages efficiency and quality. In this respect there is no doubt that the consumer in India has become far more quality conscious over the last few years and as a result of experience. The introduction of Porvic separators some years ago by Chloride and Exide Batteries (Eastern) Private Ltd. has meant that the previous weakest part of a battery, the wood separator, was avoided, and replaced by the indestructible plastic separator.

Because of the somewhat widespread smaller assemblers or rebuilders, there is some times the belief that the manufacture of a storage battery is a simple matter. But a visit to one of the larger units does enable a somewhat is considered necessary for the production of a quality engineering article. Fully equipped laboratories including air-conditioned test rooms, chemical and electrical laboratories, rubber testing laboratories in those factories which make their own containers, a thorough knowledge of the various electrical, chemical, rubber and plastic technologies involved are all essential requirements. The better quality batteries as produced in India under correct quality control process methods compare favourably with batteries produced anywhere in the world and furthermore in view of the rigorous conditions which are met in the transport field—maintenance not always being of the highest standard, to say the least—this essential need for top quality is a necessity and not a luxury.

The Indian Standards Institute has taken up the question of Standards for various types of batteries and its specification for light motor vehicle batteries, have been in operation now for some time past. It is a sound specification based on world practice in this matter and it should not be beyond the capabilities of the various Indian manufacturers to meet its requirements. It calls for various tests including a very satisfactory life testing procedure, all of which should help to raise the quality of the batteries available to the Indian consumer.

It will be seen, therefore, from the above remarks that the storage battery industry has already achieved very creditable progress but it has the challenge of an increasing demand both by quantity and by an increasing range of types of batteries. It can be fairly said that where there is sufficient demand and production can be economically arranged, the Indian storage battery industry will certainly meet this demand. It is keeping abreast of latest techniques and has already, over the past few years, introduced many new types of production to its manufactures. A great deal of new plant has been installed over the past few years and this has helped enormously in these difficult days when foreign exchange expenditure must be kept to a minimum.

In this respect the two largest units have installed lead recovery plants which in themselves effect major savings of foreign exchange each year, and which in times of international crisis can help to keep supplies of storage batteries available to all essential users throughout the country when imports of essential raw materials are prejudiced. Thus, this industry is certainly playing its full part in the Indian economy.

* * *

The very mention of the word "SHALIMAR" conjures up visions of riotous colours. Here is an admirable account of an industry from the pen of a renowned specialist.

PAINT INDUSTRY

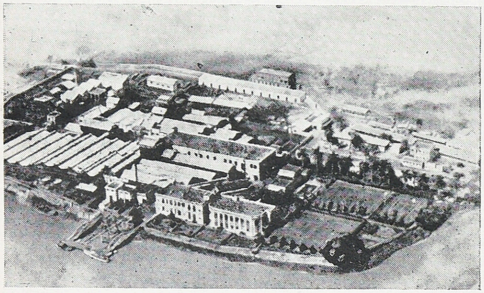
G. H. GATES-REED

Publicity & Sales Promotion Manager, Shalimar Paint, Colour & Varnish Co., Private Ltd., Calcutta

Two and a half lakhs gallons of paints in three items only was the initial order of one of the Second Five-Year Plan major projects. And that paint is being made in India—as have been, and are annually the vast and varied requirements for the new foundries, power stations, and refineries as also for a whole range of important constructions, that are the private sector's contribution to India's Industrial Revolution. Nor must we overlook the protective and decorative paint finishes for the products of these industries.

In fact, the paint industry, although a light industry and relatively small is shouldering a heavy burden and playing a most responsible role during this critical phase in the country's development. It is as well therefore that it is the essential servant of all industries. Government or private sector operated, one can say with truth and confidence that it is well equipped in men and machines, experience and technical knowledge, to do the job well, as in fact it has done since its inception in 1902 when the Shalimar Paint factory was set up at Goabaria.

There are now between 150-200 units manufacturing paints and varnishes in India, with Rs. 4.18 crores invested in 46 of the industry's major units. These units are located mainly in Calcutta and Bombay and according to official figures, the industry's target for 1960—61, is Ready Mixed Paints, Varnishes, Enamels, 65,000 tons (39,000); Nitro-cellulose bases finished 5,00,000 galls. (3,00,000); (estimated production in 1955/56 is shown in brackets).



An aerial view of the Shalimar Paint Works at Goabaria, Howrah Dist.

It should be pointed out that modern paint finishes, particularly of an industrial nature and based on synthetics, are very much lighter than the older types of formulations to which official plan figures were and are presumably related; as a result the industry is officially quoted as falling short of plan target figures although this is not really correct.

What is more significant is that, whereas in the pre-Independence days, the paint industry was producing mainly construction, marine and domestic finishes, since the Plans and industrial development gained momentum literally thousands of new formulations have been added to the paint industry's repertoire in order to meet from indigenous sources, the requirements of India's new manufacturing units.

It is fortunate, therefore, that the leading member firms have overseas connections, particularly with U.K. organisations, so that in the past even when the need to manufacture special finishes did not arise the industry was able to anticipate new and changing demands, keep up-to-date with technical "know-how" and to plan and test well ahead. Consequently, the industry is to introduce new formulations adjusted to local conditions, immediately the need arises.

The story of the growth of the Indian electrical engineering industry, among the newest and one of the most important of all the industries to be established here when related to its paint requirements, graphically demonstrates the essential role being played by the paint industry and shows how it how it has responded more than adequately. Apart from meeting the increased demand for standard paints for the new factories housing these developing industries, the products of the electrical engineering industry have called for a very wide, varied and specialised range of insulating varnishes, compounds and protective coats which are as often as not an essential, almost mechanical part of the electrical equipment itself.

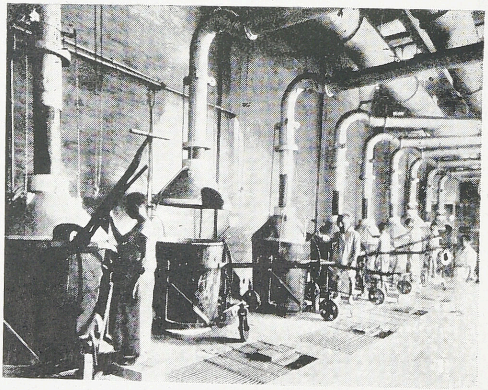
Since 1947 India has become selfsufficient in a variety of articles all calling for paint finishes, made by the electrical engineering industry among them electric motors, ceiling fans, car batteries. Comparative figures of these

Item	Year	Production	Year	Production
Electric Motors	1946	45,880 H.P.	1956	347,000 H.P.
Fans	1948	180,000 Units	1956	338,900 Units Fans
Power Transformers	1946	38,932 K.V.A.	1956	901,000 K.V.
Radio Sets	1947	3,036 Units	1955	81,000 Units

items emphasise the trend; although targets have not yet been reached.

In 1955 production increases over 1954, ranging from 50 to 100 per cent, were recorded for (among other products) electric winding wires and electric house service meters; and in 1955 among items manufactured in India for the first time on a commercial scale were alternators and cycle lighting sets.

Among forward plans, one of the more grandiose is for the manufacture of heavy



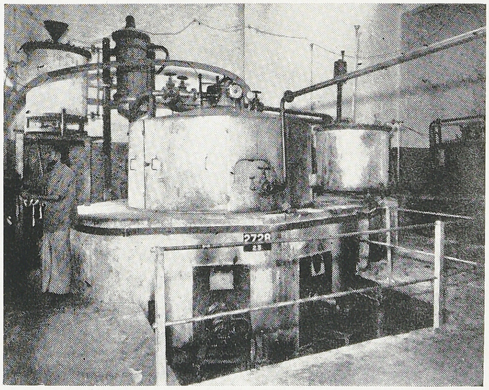
A wide variety of high quality varnishes are produced in this Varnish Kitchen which shows a battery of oil-fired kettles in action

electrical equipment in Bhopal—over a seven year period possibly Rs. 25 crores will be invested in the manufacture of heavy transformers, industrial motors, traction motors and switchgear.

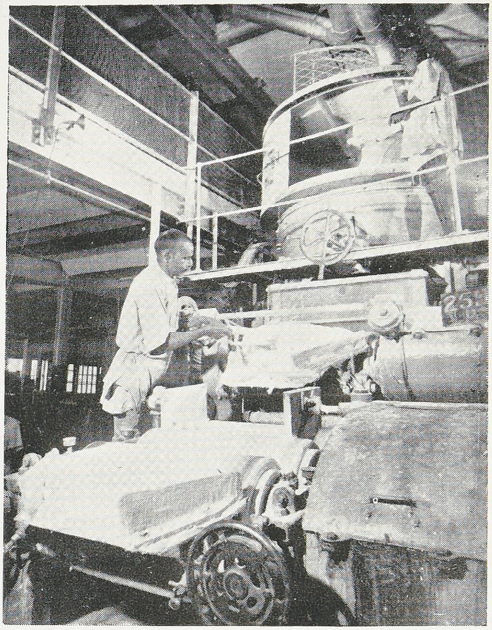
Insulating Varnishes

The important point to the paint industry is that prior to the last war no significant quantities of insulating varnishes, compounds and paints were manufactured in India as demand was insufficient and could be better satisfied from imports. Whereas it is relatively easy to increase by several hundred per cent output of a standard line which has been in production for many years, as with marine finishes, red lead, aluminium paints, the calls made upon the paint industry with reference to the introduction of specialised industrial finishes, as exemplified by the above story of the birth and growth of the electrical industry in particular, have called for considerable re-investment in research, equipment and technical services by the paint industry in order to meet satisfactorily these new demands.

The point could well be made here that in these early days of formulation and manufacture the industry has had to expand considerably its technical sales services often to the extent of advising about paint application equipment and assisting in its local pre-fabrication. At this stage of slowly developing demand, these services are costly in relation to the immediate return but are essential in the



1000 gallon oil-fired A. P. V. Scmmer Stand Oil and Ester Gum plant



Paint making from the mixer, top, through the rollers, centre, to the container.

future interests, particularly as India's younger industries have much to learn in respect of product finishing.

Other specialised finishes made in India for the first time in recent years, are a multitude of stoving enamels, protective and decorative, for the products of many new light industries (lighting fittings, cycles, hospital equipment, etc); crinkle, wrinkle, polychromatic, hammered, and similar finishes (office equipment, typewriters, instruments). Also, only in recent years, have cellulose based industrial paints been manufactured in India on any scale. To-day, annual production is in the region of 300,000 gallons, against an installed capacity of 800,000 gallons. The expansion of the indigenous automobile industry was the motivating influence behind this step. The very rapidly developing cycle industry also makes heavy demands on the paint industry.

And on both the domestic and industrial fronts, India is in step with the West through the introduction of emulsion paints. These are

only some of the problems tackled and solved by the paint industry in the service of general industrial expansion.

The inter-relationship between Government Five-Year Plans and the exploitation of heavy industry by both Government and the Private Sector, is an acknowledged and obvious one. Every new building erected requires paint protection for the steel, wood and other materials used in its construction whether it be a power station at a new dam site or a completely new city such as Chandigarh. Many of these will be to the new paint formulations (emulsion and synthetic based) for the modern qualities of rapid drying and ease of application, utilising the minimum number of coats to obtain maximum effectiveness, apply to construction paints these days. Other special paints, particularly in the case of the chemical and refining industries (The Sindri Fertilizer Factory and the Trombay and Vizagapatam developments) are manufactured indigenously; chemical resistant and high temperature heat resistant paints have been manufactured in India for the first time over recent years, as have chlorinated rubber and epikote based and insecticidal paints. And the factories of the old-established industries which may not need paints for their finished products (coal, cotton goods, jute) require paints for their new buildings.

India, with the fourth largest railway system in the world (34,736 miles), now has her own locomotive and boiler factories as well having taken up, on a large scale the construction of railway rolling stock, coaches and wagons. The indigenous production of coaches increased from 673 in 1951—52 to 1,221 in 1955—56, of locomotives, previously imported from 27 to 179 in the same period. For wagons the figures are 3,707 in 1951—52 and 14,314 in 1955—56. There is little need to emphasise the reflection of these figures on increased demands for paint finishes.

Plans for the expansion of the iron and steel industry, already to be credited with remarkable output increases, indicate the calls that are and will be made on the paint industry for finished steel must be protected by paint in its unexploited state and again after it has been used for constructional and manufacturing purposes. The output of steel will be nearly trebled within the next few years.

The above briefly emphasises the obvious but important relationship between the development of Government projects, heavy industry and light industry and the paint industry. As already mentioned, the indigenous paint industry is able to cope, provided Government acknowledges the need to be realistic in its approach to the paint industry's demand for basic materials, for the manufacture of specialised finishes.

To paraphrase Sir Winston Churchill; Give the Paint Industry the materials and it will do the job and do it well.

***

The United States of America have, in all, nearly 3½ million miles of road. For some 700,000 miles of these—the Federal Aid Primary System, the Federal Aid Secondary System, and certain urban roads and streets—the Federal Government pays half the cost of new construction and major improvement. All remaining roads and streets are the responsibility of the State concerned, the County, or the city or town, or are financed jointly by all three. Within the Federal Aid Primary System comes the great 'Interstate System,' 40,000 miles of road forming a network from State to State over the entire Union.

The individual States' share in the cost of road work is in general financed by vehicle and fuel taxation revenue. Twenty-five States have voted the whole of this revenue to road work and in some cases the State's expenditure on roads exceeds the taxation revenue.

The 3,000 miles of toll motorways are in a different category again: they are financed by loans raised either by private enterprise, or by the State or municipality, repayment being effected in the main by toll receipts.

The Indian railway system is Asia's largest and world's fourth largest and here our Union Deputy Minister gives a fine account of its gigantic growth.

INDIAN RAILWAYS

S. V. RAMASWAMY

Deputy Minister for Railways, New Delhi

The beginnings of civilisation, as we know it to-day, can be traced back to the days when the steam engine made its debut. In India, the first regular application of the steam engine for purposes of railway transport commenced on April 16, 1853. Incidentally, this also happened to be the first train in Asia and it ran about 25 years after the world's first train ran in the United Kingdom.

Few amongst those who rode the first train from Bombay to Thana on that historic April 16 could have visualised the staggering growth which railways in this country have experienced since then. From a few straggling lines which this country had in the middle of the last century, we in India to-day have over 35,000 miles of railway lines, giving the Indian railway system the distinction of being Asia's largest and the world's fourth largest. It is also the world's second largest State-owned railway system, that of the USSR being the first.

How big are the Indian Railways to-day? With a fleet of about 10,000 locomotives, 23,000 coaching vehicles and around 250,000 goods wagons, the railways operate something like 4,500 passenger trains and 2,500 goods trains every single day.

The phenomenal increase that has occurred both in passenger and goods traffic since the last war has, paradoxically been responsible for one of the major problems which the Indian Railways have faced during the last few years, and continue to do so to-day. The volume of traffic has outpaced the availability of rolling stock and other resources. The available resources include a large proportion of overage rolling stock, a serious handicap inherited from the pre-Independence days.

It was in recognition of the size of the rehabilitation problem and the magnitude of the new tasks which have been entrusted to the railways during the Second Plan period, that the Government of India have allocated to them a sum of Rs. 1,125 crores, which is roughly one-fourth of the total for the whole country in the public sector. A major portion of this allocation would necessarily have to be devoted to the rehabilitation of worn-out assets, and

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Issued by Southern Railway

only the balance will be applied to the development and modernisation of various means of operation.

The total quantum of goods traffic which the railways had built up during the first 103 years of their existence, *i.e.*, upto the end of the First Plan period, is now required to be increased by more than 50 per cent in the brief five years covering the Second Plan.

It will be admitted that this is a major job and will call for the best of which Indian railwaymen are capable. Judging by the past performance of the Indian Railways, a degree of optimism about the future is not unwarranted.

There have been difficulties, and some of these still continue. In the first two years of the Second Plan the railways were beset with serious shortages of raw materials, particularly steel. As a result of the orders placed abroad by the railway steel purchase mission last year, the position in this regard has markedly improved. Improvements have also taken place in regard to the supply of cement and other construction materials.

The shortage of foreign exchange is a national problem, and the railways being one of the largest consumers of foreign exchange in proportion to the size of their Plan, have also felt the pinch. To the largest extent possible, however, efforts are being made to increase indigenous production of materials hitherto imported from abroad. To the extent that this can be done, it would prove to be a blessing in disguise.

Although we have hundreds of small and big schemes to improve the railway system in this country, in the ultimate analysis, it is the human effort which really counts. Railway Administrations are doing their best to look after the welfare of railwaymen and their families, so that the workers can put in their unstinted best in their job.

Maintaining the efficiency of the railway system is a two-way responsibility. It is as much a responsibility of railwaymen themselves as of the rail-using public.

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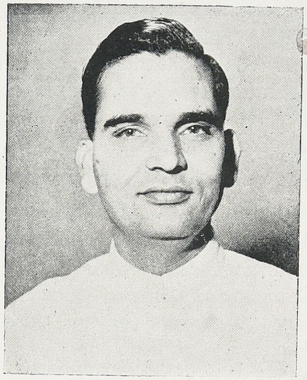

Our most versatile Minister sketches in his masterly way the importance and future of this great industry.

AUTOMOBILE INDUSTRY

MANUBHAI SHAH

Union Minister of Industry

In furtherance of the aims and objectives of our second Five Year Plan to create a synthesis of heavy, medium and light industries with emphasis on employment, there are few industries whose development would help to achieve this aim more than the automobile industry. Although primarily concerned with the production of mechanised transport, the automobile industry also forms the nucleus for a variety of other industries.

It consumes a large variety of raw materials both basic and semi-processed. It makes use of every known method and process of technology and manufacture in one or more of its components and in its use of various raw materials. It demands from its employees skill of a very high order. The very structure of this industry is such that it stimulates scientific progress, subsidiary and feeder industries and employment. There are heavy automobile manufacturing plants in every industrially advanced country employing thousands of workers with the latest production techniques to turn out the complete vehicles; feeding these main plants are ancillary industries, scattered all over the country, each manufacturing numerous components which go into the automobobile and which are not normally produced by the vehicle manufacturers themselves. Some of these are light or small-scale units having only a handful of tools and men, but others may employ hundreds of men and are equipped with latest techniques and means of production. Besides, there are industries which deliver to to the main and ancillary plants raw materials, semi-finished products and finished products which are used, not only for the automobiles, but for other industries as well.

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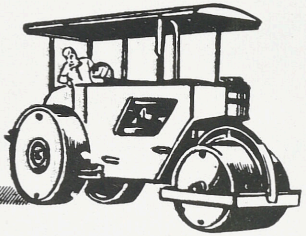

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Wherever the motor vehicles operate, they also bring in their wake garages and petrol pumping and servicing stations to cater for their operation and maintenance. The garages may be of the types found in big towns capable of completely overhauling a vehicle or they may be more roadside service stations with resources only to replace the simple parts of a vehicle.

Not only does the automobile industry fit in nicely with the very pattern of industrial development which we visualise in the second Five Year Plan, but it also helps in many ways to implement other schemes of the Plan. The motor vehicle user today pays various taxes amounting to a substantial sum to both the State and Central Governments. There is the import duty on motor vehicles and components, excise duty on tyres and tubes, central petrol duty, state vehicle tax, state sales tax on petrol, sales tax on the vehicle and accessories, and municipal wheel or vehicle tax and octroi.

The money thus obtained is mostly channelled by the Central and State Governments into the general funds needed by the Exchequer and for the second Five Year Plan. They also help local bodies to augment civic amenities.

In the fast developing modern economy, where transport has a vital place, the road transport serves the country more effectively than the railways. Countries now rely more on roads for movement of passengers and goods than on any other form of transport; as the nation becomes more and more industrialised, the utility of the railways tends to occupy a second place. The development of the indigenous road transport industry is, therefore, an important adjunct to the implementation of the various schemes of the Five Year Plan, which lays emphasis on industrialisation.

The production target in the second Five Year Plan for the automobile industry is 65,000 vehicles of all categories, the indigenous contents of which, in terms of value, will reach upto 75% to 80% by 1960—61. This represents more than 100% increase in output both in quantity and in indigenous contents compared with the production at the end of the first Five Year Plan. The total production of automobiles which was Rs. 25 crores in 1950 has now risen to Rs. 50 crores in 1957 and is expected to touch Rs. 110 crores in 1960. The capital invested in the automobile and ancillary industries in the country is estimated at Rs. 25 crores and in employs over 23,000 people.

Observations have been made that the objectives of the second Five Year Plan could have been achieved more effectively had the development of the automobile industry been planned in a better way. Any planning after independence had necessarily to be based on the somewhat un-coordinated development that had taken place earlier. We were in no position to start on a completely new basis and we had to rationalise and integrate the then existing situation into a well co-ordinated fruitful long term national policy. It was only

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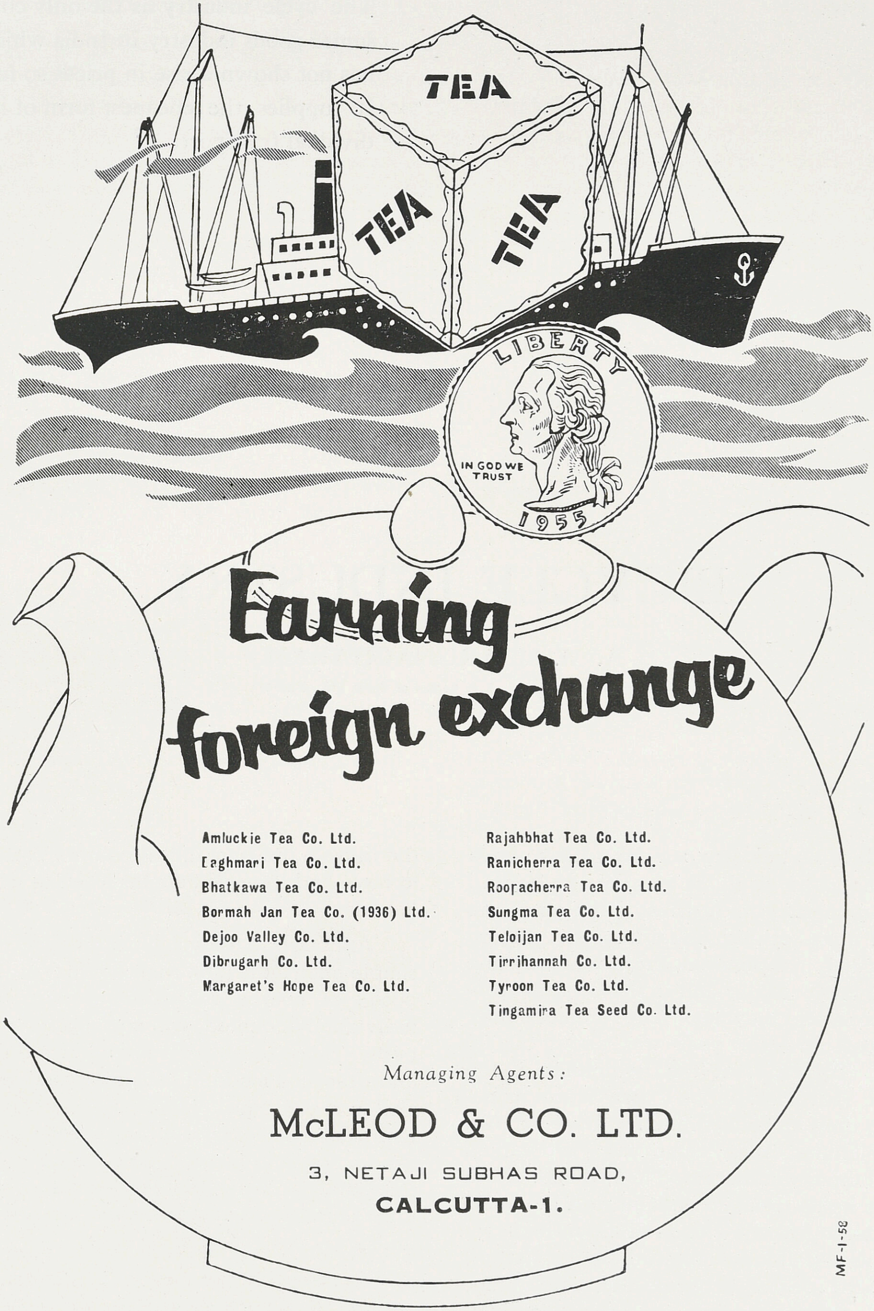
after the first Tariff Commission Enquiry that some drastic action like the closure of several existing pure assembly establishments was taken to put the industry on a better footing. Even after that, the position among the remaining indigenous manufacturers still continued rather vague and undefined. The second Tariff Commission's Report, submitted in the latter part of 1956, further streamlined the Automobile Policy. Once again, the difficult foreign exchange position may cause the industry to further streamline itself by accelerating the indigenous content, improving production methods and concentrating on fewer types, which all may contribute ultimately to the good of the industry itself. From the continous examination of the working of this important industry and the general spirit of co-operation with which it functions, the capacity and competence of the Automobile Industry of India to reach the target of the second Five Year Plan, both quantitatively and qualitatively, amidst all difficulties, is beyond doubt.

The question of quality of Indian automobiles—cars, jeeps and trucks—has been undoubtedly solved to a great measure of satisfaction and further improvement is continuously taking place, thanks to the guidance of the Government and the valuable co-operation of the industry. The question of cost still continues to persist because of the low volume of production in spite of the fact that the number of models and types of cars, jeeps and commercial vehicles manufactured in India is perhaps the smallest in the world. No other country in the world manufacturing automobiles, imports or manufactures fewer types and models than our country. This is a happy and welcome approach. But, in spite of this, the volume of production both due to scarcity of internal and external resources, (particularly the latter because of the current foreign exchange difficulties) and the comparative lack of demand on a substantial scale, makes the Indian costs in every category somewhat higher than the corresponding places in advanced automobile manufacturing countries. Cost of production and price structure are essentially the co-efficient and function of the extent of motorisation and industrialisation, well supported by rising demands, the cost and price tend to go down. There is no doubt that the more we go towards the optimum volume of production of automobiles the less will be the cost of production in relation to the prices of raw materials.

One important question which still dodges solution is the question of manufacture of a very cheap light passenger car which could be within the reach of a lower middle class family. Perhaps, it may not be difficult to manufacture such a car within the price range of about Rs. 6000 per unit by a well integrated programme of manufacture, through a joint manufacturing programme properly divided among the existing three passenger car manufacturers, utilising their existing resources with small additions of machinery and tools, if necessary; and sold in an agreed manner through their distribution organisations. The scheme can be worked out with full joint consultations and cooperation so as to make it most practical, economic and workable. However, for the time being, this may have to wait till the foreign exchange position somewhat eases so as to permit of a bulk production programme of such a cheap sturdy small passenger car.

*
* *

The total allocation for transport and communications in the Second Plan is Rs. 1,345 crores. The allocation for roads is to be reduced from Rs. 246 crores to Rs. 221 crores, for road transport from Rs. 16.5 crores to Rs. 11 crores and for posts and telegraphs from 63 crores to Rs. 62 crores. Correspondingly, there are small increases in the allocation for ports and harbours and shipping.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1955
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The cycle industry is the only consumer goods industry in India which has not shown a rise in prices so far. It supplies the cheapest form of individual transport.

BICYCLE INDUSTRY

A. M. M. ARUNACHALAM
Managing Director, T. I. Cycles of India Ltd., Madras

The bicycle industry can be said to have well established itself as one of the leading light engineering industries supplying the cheapest form of individual transport. Before India became independent, there was only one bicycle manufacturing unit in the country producing complete bicycles. The annual output in the best pre-war year was about 50,000 bicycles. By 1951, at the beginning of the First Five Year Plan period, two more manufacturing units, in collaboration with well-known British manufacturers, came into production and the output was increased to 1,14,000. These two units had a great advantage with the backing and technical knowledge of the well-known manufacturers which enabled them to start off and achieve greater progress than other units. Actually, with the starting of these two units, the bicycle industry in this country can be said to have had the real impetus to make it what it is to-day.

Although a bicycle looks a comparatively simple affair, it is little realised that it is composed of nearly 200 different parts which if individually counted, will add up to over 800 parts. Since these parts are all of high quality and precision-made, it calls for great technical skill to make them Emphasis on precision and technical excellence is all the greater when the production is to be on a mass scale. It is from this point of view that large-scale production units score a distinct advantage over small scale units.

As the cycle production in the country increased, it became more of an economical pro-

position to start manufacturing cycle com. ponents, and during the last three or four years this side of the industry has made very rapid progress. The development of the industry as a whole in India did not follow the same pattern as that prevalent in most highly industrialised countries, which was to develop subsidiary industries who specialised in the manufacture of few component parts which became common to the whole industry, and these were supplied to the major manufacturers who thus saved the expense of putting up plant to manufacture sufficient quantities only for their own requirements. In our country this aspect of component production has rested on the major manufacturers and as a consequence the anomaly arises whereby, in a country which is comparatively under-industrialised, the major manufacturers of cycles are producing as much as 90—95 per cent of the total component parts which go into their cycle.

The Government have also enabled the manufacturers to bring in modern mothods of mass production and introduce a flow-line system of production, which ultimately will be beneficial to both large and smallscale manufacturers as these components will be produced at economical prices.

The progress of the industry has been so good that recently two units have started manufacturing freewheels and chains, which are the must complicated components of a cycle. Shortly one or two important components, such as bottom bracket axles and bottom brackets are expected to be manufactured in the country in large quantities and of high quality.

Steel Tubing

One of the most important items required for the manufacture of cycles is steel tubing. Most of this material had, until recently, been supplied by Tube Products Limited, Oldbury, U.K. Two new companies for the manufacture of steel tubing in this country; namely Tube Products of India Limited and the Indian Tube Company, have now put up plants and are supplying this tubing in large quantities to all the cycle manufacturers. The tubing supplied is E.R.W. (Electric Resistance Welded) quality. These two companies have been able to go into production in a very short period of time. The fulfilment of the policy of the Government and the intentions of the manufacturers to make the cycle industry in India self-sufficient is borne out by the very fact that five years ago manufacturers were allowed import of components to the value of Rs. 80/- per pack, and to-day's figure has been reduced to only Rs. 7.50. By the end of 1958 or the middle of 1959, the plan and target would be more or less to eliminate altogether the import of components necessary for cycle manufacture.

Stable Prices

The full economies of this indigenous manufacture are perhaps not at the present time apparent to the purchasing public, because all the raw material required for the manufacture of these components has, of necessity, to be imported, and it is anticipated that adequacy of indigenous raw materials which, generally speaking, are of a special type to enable intricate manipulations and high speed machining will not be available from indigenous sources until 1961, but the manufacturers are passing on these benefits to the public through not increasing the prices of their cycles and have in fact, over the last few years, reduced their prices, and it is fairly safe to say that the cycle industry is the only consumer goods industry in India which has not shown a rise in prices so far.

The Planning Commission, having realised the importance of the large-scale manufacturers, have, however, for the sake of a balanced economy, been encouraging development of small-scale units. A large number of small-scale units on the cottage industry basis are mainly situated in the East Punjab. While most of these people have the necessary skill, it is important that the departments looking after this cottage industry should make available

The dawn of a bright future . . .

TO MILLIONS today, their only hope of securing better prospects in life lies in finding new channels of vocations. A cycle to them has become a symbol of their determination to seek a better livelihood. They stint and save to collect sufficient money to possess this miraculous machine which will open up new opportunities for them.

At T.I. Cycles we realise what a cycle means to its owner. And it is this knowledge that prompts us to build cycles that will last a lifetime. Although we produce two hundred thousand and more 'Hercules' cycles every year, the demand is far ahead of the supply. That shows the confidence people have in 'Hercules' cycles.

T. I. CYCLES OF INDIA LIMITED, MADRAS

Manufacturers of **Hercules** cycles

TIC 230(a)

to these people proper raw materials and enough facilities to inspect and keep a close watch on the quality. Otherwise, most of these components would not find an easy sale in the market. In this context, one is happy to realise that the Ministry of Commerce and Industry have formulated schemes for helping these small units, and are in the process of establishing institutes in the various centres. The output of this section could easily be absorbed by a large number of small-scale assembler manufacturers and certain replacement markets. While emphasis on the cottage industry is appreciated, they should work as complimentary to each other and not at cross purposes.

The Indian Standards Institute has set up standards for quite a large number of cycle parts. Most of the major manufacturers are already producing cycle parts of approved standard and specifications. The Standard Institute has proposals to issue Certificates of quality on components conforming to the standard set by them.

For a proper integration and co-operation of all the interests in the bicycle industry, it is a happy augury to note that recently two Cycle Manufacturers Associations have merged together and have formed one Association on an All-India basis. The Development Council comprising manufacturers, Government traders, and distributors is continuing to do very useful work in co-ordinating the various interests of the industry. Full measure of credit for attaining the target set under the First Five-Year Plan and for establishing this industry in such a short span is, in a large way, due to the major manufacturing units, particularly T. I. Cycles of India Limited, Sen-Raleigh Industries of India Limited, Hind Cycles Limited, and Atlas Cycle Industries Limited. The medium scale manufacturers have also contributed considerably to the success of this industry.

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Transport industry plays a very important part in the movement of goods and men and the future of motor cycle industry is very great,

AUTOMOTIVE TWO-WHEELER INDUSTRY

S. R. SUBRAMANIAM

Managing Director, The Madr s Motors Private Ltd., Madras

The Second World War had an adverse impact on the balance of national economy in many countries and especially in India. The object of the country after the War, therefore, was to stabilise the national economy resulting in the rise of the standard of living of the people. To achieve this common objective, the Government formulated and implemented the Five Year Plans, which had as the aim, "The achievement of self-sufficiency". The advent of the Five Year Plans led to rapid industrialisation all over the country. Though halting and half-hearted in the beginning, the industrial growth, recently has been phenomenal. A variety of industries, big and small, has grown up all over the country and the State too is claiming an increasing share in this industrialisation. Industrialisation necessarily involves a well regulated and properly distributed form of transport; the transport industry, as such, plays a very important role in the movement of goods and men which are very vital for the various Five Year Plans as well as the Industries. Though the railways have made considerable improvements, they have not been able to meet in full the traffic demands. The existing ancilliary road transports such as lorries and trucks have not kept pace with the demands either. But, worse still is the position of passenger transport. A casual glance at the long queues at the various transport stations in the Cities, will convince any one, that the problem of personal transport remains largely unsolved still. An important step in solving

this mighty problem of transport was taken when the two wheeler industry was established in India in 1955 with the encouragement and assistance of the Government of India.

Let us examine briefly the history of this industry in India. During the thirties and the early forties of this century, the automotive two-wheeler was not very much in use in India. The imports of motor cycles were only about 2,000 to 3,000 and the import of scooters was almost negligible. A comparison of this with the use of two-wheelers in foreign countries would make interesting reading. In most Western countries, the two-wheelers have come to stay as a personal transport for a large percentage of workers in industries whereas in our country till a few years back, the two-wheelers have largely been a sporting mount for the fashionable young. But with the rapid industrialisation of India, the need for a quick transport was increasingly felt.

Of course, the car was there; but at the prices they were sold it could be the choice of only the favoured few. All the time great changes were taking place. Many industries were started. The number of those engaged in trade, commerce, transport, production, etc. more than trebled and new industrial cities were springing up all over the country. Consequently, local transport became a major problem resulting in bottle-necks and strain on the already existing resources and facilities. The successful implementation of the First Five Year Plan accentuated this strain. There was, therefore, a growing demand for an economical form of transport and it is in this context that the development of the two-wheeler industry in India is significant.

The Enfield India Limited are the pioneers in the establishment of the motor cycle industry in India. Planned and promoted in collaboration with the Enfield Cycle Co. Ltd., Redditch, England, their factory is located at Thiruvottiyur near Madras. In their production line are the famous Royal Enfield motor cycles and three-wheelers Their range includes the economical light-weight 150 c.c. with features of a bigger mount and the luxurious 350 c.c. the engine of which is also used in their three-wheelers. This industry has made rapid progress and is ahead of its phased programme in as much as the indigenous content of its product at present stands at about 50 per cent. It is estimated that though according to the phased programme they should increase the indigenous content to 100 per cent by 1960 thus completing the entire process of manufacture of motor cycles in India, they would be in a position to do so a year ahead. Though the licensed capacity is 5,000 motor cycles and 1,800 three-wheelers a year, this factory is geared to produce 10,000 vehicles a year which should meet the growing demand of the country for this type of transport.

The other-two-wheeler manufacturer, the Automotive Products of India Limited, have their factory in Bandup in Bombay. In collaboration with the famous Italian firm of Innocenti of Milan, they are manufacturing progressively Lambretta Scooters, Scooterettes and Auto Rickshaws, which have become quite popular recently in this country.

The need for this form of personal transport can well be illustrated by the fact that against an import of 2,000 to 3,000 vehicles in the early forties, the industry at present is producing in India nearly 10,000 vehicles per year and the plant and machinery in this industry are well geared to meet the still growing demand.

The Government are well aware that it is not advisable to license any further units to manufacture two-wheelers since it is not worthwhile spending valuable foreign exchange in founding new units which will take considerable time to go into production, besides hampering the growth of the existing industry. However, doubts have been raised as to the wisdom of allowing a kind of monopoly in this industry. There need be no apprehensions on this account, since the policies in respect of both production and prices are decided in close conjunction with the Government and the latter have a decisive voice in the matter of

price control. After all, in any industry, prices are mainly determined by two factors :—

(i) quantitative production and obtaining optimum results in production efficiency in all its aspects, and

(ii) the prices of raw materials; not to speak of the cost of labour which plays an important part in all manufactures.

For quite sometime to come, the production to full capacity is not feasible for various reasons; equally the price of raw materials has shown a tendency to increase. These two factors, therefore, govern the present price of vehicles. It is, however, expected that with the increase in quantitative production with the consequent reduction in cost of production, the price factor will become more favourable to the buying public.

The success of any industry depends on the quality of its product and also the services it renders to the buyer. It is, therefore, gratifying to find that this industry has placed great importance on service after sales. They have built up a net-work of Dealers' organisation all over the country for satisfactory after sales service. This makes it possible for the user to have easy accessibility in any corner of the country. In this connection, the manufacturers depend to a large extent for spares on imports till such time the industry achieves self sufficiency in this respect. The question of granting import licences for import of spare parts to the extent possible is, therefore, of some importance to the industry.

A sympathetic consideration and a favourable decision in this matter by the Government will greatly help the indigenous industry in the initial stages and also the buyers.

In regard to the grant of ad hoc licences, though the Government have generally been very prompt, it sometimes happens that valuable time is lost in obtaining these due perhaps to non-observance of certain formalities by the applicants for licences. It may be possible to avoid even this if the Government is pleased straightaway to grant fifty per cent of the value of these ad hoc licences at the beginning of the respective licensing period and revising the balance of fifty per cent within a reasonable short time after scrutiny of the relevant date supplied by the manufacturers. This would enable the manufacturers to plan their production on a certain definite basis well in advance. But in fairness to Government, it is admitted by the manufacturers themselves that by and large the Government have been very considerate in this respect.

With the foreign exchange situation as it is today, the Government have been stressing the export of Indian products to foreign countries to enable India to earn foreign exchange. The Government is also eager that the export of new indigenous products should be given some priority. The Indian two-wheeler industry has great prospects in this direction. Almost all the Asian countries depend for supply of two-wheelers on imports since none of them has a two-wheeler industry of its own. The Indian two-wheeler has, therefore, a wide field for the export of its vehicles. The export of two-wheelers apart from expanding considerably the sales potential of the industry will help to reduce the production cost thus making it possible to reduce the price of two-wheelers. More than this, this would help India to earn valuable foreign exchange. This will help in a big way the successful fulfilment of the Five Year Plans and thereby the national economy as a whole. The industry, therefore, looks forward to the Government to give all its assistance through its organisations all over the world, to assist the industry in their export programme.

At home, the demand for two-wheelers is increasing rapidly. It is no longer the sporting mount of the fashionable young men but is increasingly being considered a necessary form of easy, quick and cheap transport. With the vast improvement in provincial roads, the two-wheeler has come to be considered by many more as an essential utility transport.

To the vast multitude of employees of all grades engaged in trade and commerce and in other walks of life in the cities, the two-wheeler is fast becoming a necessity.

Besides this, the Defence Services and the Police and security departments are bound to requisition the two-wheelers in larger numbers. The Postal Department ever eager to make their delivery services more prompt and expeditious, have also started to use the two-wheelers for delivery of letters and telegrams in the cities as a beginning. Their demand is bound to grow.

There is, therefore, every reason to believe that the Automotive two-wheeler industry can look forward to a prosperous future.

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LEAF SPRINGS INDUSTRY

There are at present six manufacturers of leaf springs; two of them are located in Bombay, one each at Mangalore, Jamshedpur, Kapurthala and Faridabad. In addition, there are about 25 small units in different parts of the country, producing leaf springs and spring leaves mainly for replacement purposes. It is also stated that there are a large number of cottage units, primarily undertaking repairs and also producing loose leaves of small sizes.

During the last few years, the automobile leaf spring industry has achieved considerable progress, particularly after 1954 when protection was granted to the industry. One of the companies in Bombay has acquired additional equipment of modern type which includes an automatic conveyor type electric furnace and automatic eye-rolling, hardness testing and special grinding machines. It has also expanded its productive capacity to 1,000 tons per year on single shift basis. The other company at Bombay has installed two modern cambering machines. The firm located at Bangalore has also installed hardness testing, fatigue testing and bend testing machines as well as shot peening machine which improves the fatigue life of springs. Further, a continuous conveyor type furnace for hardening and tampering spring leaves with automatic pyro - meter controls and temperature recorders is under erection in its works. With the installation of the new furnace and other additional equipment, the installed capacity of the Mangalore company will increase to 1,200 tons a year on single shift basis. The factory at Jamshedpur has installed a modern plant for the manufacture of leaf springs according to specifications. The company at Kapurthala has also installed cambering machines and furnaces of new designs which have recalled in increasing the firm's capacity from 1,000 to 1,800 tons per annum on single shift basis. The Faridabad factory has acquired a manual eye-rolling machine, a cambering and load testing machine and a hardness testing machine. Since 1954 production by the organised sector of the industry has been more than doubled and utilisation of the installed capacity has progressively increased.

There has been an impressive rise in production in recent years. Production of leaf springs and spring leaves improved from 2,300 tons in 1954 to 2,912 tons in 1955. In 1956, it rose still further to 4,954 tons and for 1957 the figure is being estimated at well above 6,000 tons. According to the Development Commissioner, Small Scale Industries, the estimated production by 26 small scale units was placed at about 1,600 tons. The current demand in the country for leaf springs in terms of tonnage is estimated at about 13,500 tons and the Tariff Commission hopes that the demand would increase by about 15 per cent over the next two years.

* * *

Here is a brilliant and thrilling account of India's shipping splendour in the past and the mighty steps taken to bring it back to its pristine glory.

TRIALS AND TRIUMPHS OF INDIAN SHIPPING

RAJ BAHADUR

Minister of State for Transport & Communications, Government of India

"Every maritime country looks upon its shipping as a great national asset, a powerful instrument of national economic policy, a vital need for the growth of its trade and commerce, and a second line of national defence". Thus opens that monumental document, the Report of the Shipping Policy Committee. A couple of paragraphs below these lines we come across another important observation which bears upon the importance of India as a maritime country. It runs thus:

> "India is a great maritime country. She has a large and extensive overseas trade. By her geographical position she commands the Indian Ocean and occupies a strategic position in the South and the South-east Asia. Shipping passing from West to East and from East to West has to cross the waters adjacent to India's shores. These fundamental considerations make it imperative, both in the interest of India as well as in the interest of other countries, in the Indian Ocean, that India should have a large and powerful navy, both of supply and defence".

India indeed once had "a large and powerful navy". Although today the U. S. A. owns the biggest shipping tonnage in the world, a few decades ago Great Britain happened to be the mightiest sea-power, and a couple of centuries before that the Spaniards and the Portugese contended against one another for supermacy over the Seas; yet there

is ample evidence to establish that for full 30 centuries, India maintained an unchallenged position in the old world as the foremost maritime country. Passage of time has no doubt, shed the poppy of oblivion on the glory that Indians had once achieved as pioneers in ocean-navigation and it is often forgotton that of all peoples in the world it were the Indians who first set out on oceanic voyages. It is an undisputed fact of history that even until as late as the end of the 15th century A. D. none of the Western nations had ventured out in the open oceans, and their maritime activities were largely confined to coastal waters.

The references to "sea voyages" and to "ships" in the "Rigveda", however, the excavations of the Indus valley civilisation at Mohenjodaro, the colonisation of the Pacific Islands by the Indians, the mention of the Indian port of Ophir in the Old Testament, the discovery of ancient coins in Andhra, which date back to the third century A. D. and bear the stamp of double-masted ships, and similar other historical finds, all testify to the eminence Indians had once achieved as seafaring people. Indian ships thus ruled the waves of the oceans for thousands of years before the people in the West took to real seafaring expeditions.

In the art of shipbuilding too India held the foremost position from the earliest times uptil as late as the middle of the 19th century. The famous Sanskrit treatise on shipbuilding, the "*Yukatikalpataru*" by Bhoja Narapati is considered to bear testimony to the fact that even as far back as the 6th century B.C., the art and industry of shipbuilding was thriving in India. The "bow-heads" of ships were fancifully designed. In the private museum of Shrimati Sumati S. Morarji, (Chairman of the Indian National Steamship Owners Association), which consists of some of the rarest and finest collection of curios and pieces of art, for a private museum; one can still see a head of a horse beautifully carved out of wood, which once adorned the ship-head of a famous Marhatta man of war. It has been recorded that the ship in which Prince Vijaya of Bengal led his expedition to the island of Lanka in the 6th century B.C. accommodated as many as 700 persons. From this record one can well imagine the heights that had been achieved by Indians in the art of shipbuilding. No wonder, therefore, that Lord Wellesly had once to make the following observation, which has quite often been quoted :

"From the quantity of private tonnage now at command in the port of Calcutta, from the state of perfection which the art of shipbuilding has already attained in Bengal, promising still more rapid progress and supported by abundant and increasing supplies of timber it is certain that this port will always be able to furnish tonnage, to whatever extent it may be required, for conveying to the port of London the trade of the private British merchants of Bengal".

This observation is reported to have given a rude jolt to powerful shipping and shipbuilding interests in England, who thereafter declared a relentless war on Indian shipping and shipbuilding industry. It was a war of attrition on the part of the dominant vested British interests, and a heroic struggle for survival against the heaviest odds, on the part of the nascent and helpless Indian Shipping enterprises. The following extract from the same report describing this war is almost classic in the history of our shipping and needs to be quoted in this context.—

> "As Indian ships were more durable and more economical than British vessels, an alarm was raised that British shipbuilding was in danger. It was not the advent of the steamship about the middle of the nineteenth century, when iron and steel took the place of wood, which led, as is often alleged, to the decline of Indian shipbuilding industry. It was the acts of hostility of the British Government such as the banning of Indian ships from British waters, and of the Government of India's imposition of discriminating and crushing import

> duties on goods imported in Indian bottoms, that led to its decline and ultimate ruin. Indian shipbuilding industry had thus to perish so that British shipbuilding industry can flourish. When the Scindia Steam Navigation Co., Ltd., was started in 1919, the Indian shipbuilding industry was almost extinct. Since then Indian shipping has been struggling bravely to survive and develop".

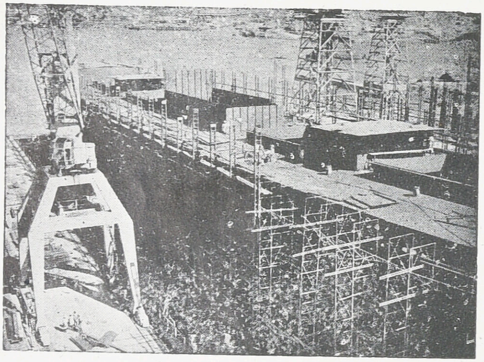
In this war, as probably in others, no scruples or principles were respected and no codes of conduct or morality were observed. The aggressor went all out to crush its victims, the Indian Shipping, without any remorse or regrets. Then it was also a war between two unequals because the entire might and patronage that the alien Government in the country had its command was poised in favour of the foreign interests. In particular the British Indian Steam Navigation Company, which held the lion's share in our overseas trade routes and also dominated our coastal trade waged ceaseless freight wars against Indian Shipping concerns with the strength of its huge financial resources and powerful governmental backing. It "wiped out one Indian shipping company after another from the coastal waters of India"; and the Government of the day missed no opportunity whatsoever, to support the British Company engaged in its predatory adventures. The Royal Mail subsidy granted to the exclusive right of carrying Government and railway cargo and passengers, the division of traffic between the Railways and the British Shipping Company at the cost of Indian trade, were all granted with the set purpose to arm this company against the struggling Indian concerns. The Indian Shipping Companies were even denied the opportunity of quoting for the carriage of Government materials or cargo. Still more obnoxious was the practice or campaign of ruthless rate-cutting indulged in by the British Shipping interests. Another unscrupulous device was the notorious system of "deferred rebate". All these and other similar tactics were adopted to create a monopoly for British interests.

The heroic battles fought in the cause of our struggling shipping ventures on the floor of the Central Legislature, however, will go down as a glorious chapter in the history of Indian Shipping. Starting from 1918 when a resolution was moved by Lalubhai Samaldas "to consider ways to encourage the shipbuilding industry in India" the battle was carried forward by veterens of the Central Assembly, like P. S. Sivaswamy Iyer, Shri S. N. Haji, Dr. Ziaudin Ahmed, Shri Jagdish Prasad and Shri P. N. Sapru. Shri S. N. Haji's "Coastal-trade reservation Bill" became a landmark in this long-drawn struggle. It compelled the Government to convene a conference at the highest level. The then Viceroy, Lord Irwin addressing the annual meeting of the Associated Chambers of Commerce in December 1928 came out with a statement recognising that the main impulse behind the Bill was "an ambition—that India should have its own mercantile marine and that it should employ Indian officers as well as be manned by Indians". This ushered in a period during which Indian shipping was fed or sustained by the Government on hopes, assurances and promises which ultimately, however, turned out to be more moonshine, because they were never realised or redeemed. The result was that at the end of World War II during the course of which the shipping tonnage of numerous countries had increased by leaps and bonds—when the U. S. had increased their tonnage from about 9 million tons to 34 million tons and emerged as the biggest maritime power in the world owning a share of 51% in the world tonnage; and when at least two of the British dominions, namely Canada and Australia had made large accretions to their tonnage—Indian Shipping was stagnating at a paltry figure of 1,27,088 tons only in 1946.

This was the picture at the dawn of independence, which after its advent provided the needed stimulus to our shipping. The Control of Shipping Act, was passed in 1947

which enabled the National Government to accept and implement the policy of reservation of coastal trade for Indian Shipping in 1950.

The growth of Indian tonnage, however, has been rather a slow process for obvious reasons, which included lack of required financial resources and shipbuilding yards. Therefore, at the beginning of the first Plan India we had a tonnage of 390,707 G. R. T. The First Plan envisaged an addition of 2,15,000 G. R. T. of shipping, during the plan period, thus increasing the total tonnage to 6,00,000 G. R. T. after allowing for obsoloscence to the extent of 60,000 G. R. T. A provision of Rs. 26 crores was made in the Act for the grant of loans to the Shipping Companies for investment



A Ship under construction

by Government in the Eastern Shipping Corporation. The entire provision was either spent or firmly committed on acquisition of ships. The Indian owned tonnage at the end of the first plan period was about 4,80,000 tons G. R. T. while ships of a total tonnage of 1,20 000 tons G. R. T. were under various stages of construction in India and foreign yards. The first plan target was thus practically achieved.

In the second plan our broad objectives are :

(i) to cater fully for the needs of coastal trade including the diversion of some traffic from railways to coastal shipping.

(ii) to enable Indian shipping to acquire a larger share of India's overseas trade. At present it covers only 6% of our overseas trade and 40 percent of our trade with adjacent countries. At the end of the second plan period this percentage is expected to gc up to 12 to 15 per cent and 50 per cent respectively.

(iii) to build up the nucleus of a tanker fleet.

The Second Five year Plan envisages an addition of 390,000 GRT, including replacement of obsolete tonnage to the extent of 90,000 GRT. The net tonnage at the end of the Second Plan is thus expected to be about 900,000 GRT at the end of the Plan period. The Second Plan provides for an amount of Rs. 37 crores for the attainment of this target

Even before the close of the first year of the Second Plan Indian Shipping Companies, both in the public and private sectors were able to acquire three second-hand ships of about 17,000 GRT, including a tanker in the public Sector, and place orders for about 1,64,000 GRT in India and abroad. As a rssult, practically the entire provision of Rs 37 crores made in the plan has been utilised or earmarked.

It is true that the plan provision of Rs. 37 crores has proved insufficient to achieve the target. It is estimated that additional funds to the extent of Rs. 45 crores have to be secured. Efforts made in this direction have met with some measure of success. Government have taken a decision to establish a non-lapsable Shipping Development Fund for advancing loans to Indian Shipping Companies both in the Private and the Public Sector. This fund will be built out of annual contributions from the consolidated fund of India, the actual size of the contributions being determined from year to year, having regard to the availability of resources. In addition, all repayments of principal and payments of interest on loans already advanced by Government to the Indian Shipping Companies would be credited to the Fund. It is expected that additional funds to

the extent of rupees 10 crores would be available in this fund during the rest of the Second Plan Period.

It has also been decided that the loans to be given to the Indian Shipping Companies out of the new fund should have the uniform effective rate of interest at 3% only both for coastal and Overseas loans.

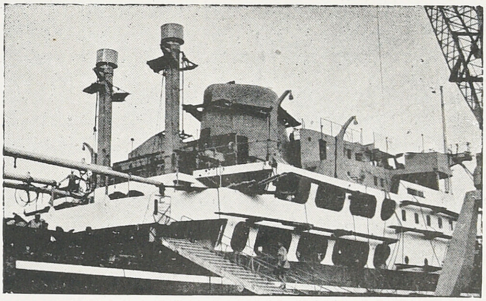
The greatest difficulty which has confronted us and stood in the way of acquisition of tonnage is not so much the inadequacy of rupee fund an the non-availability of foreign exchange. This has stood in the way of the Shipping Companies who want to purchase Second-hand ships from their own resources. The need for expansion has, however, been recognised and the Indian Shipping Companies have been permitted to acquire additional tonnage for the overseas trade on the basis of what is called the "Self Financing Scheme". Under this scheme purchases of vessals are made on deferred payment basis, the payment being made in instalments over a period of time from out of the foreign exchange earnings of the vessals themselves. Atleast three vessels have already been acquired by the Shipping Companies on this basis and it might be possible to purchase more vessels during the near future.

Government have also informed the shipping Companies that there is no objection to their acquiring tonnage for the coast, where the ships do not earn foreign exchange, on deferred payment basis provided the payment of their price of the vessel is spread over a peried of 6 to 7 years after 1961. It is hoped that some Indian Shipping Companies will be able to acquire additional tonnage on this basis also.

Government also are exploring the possibility of securing some ships for India on credit terms. Recently, an agrement has been concluded with the Government of Japan for providing Yen credit to India for purchase of Plant and Machinery, a portion of which would be made available for purchase of ships from Japan on deferred payment terms both in the public and the Private Sector. There is also a possibility of securing credit terms from Japan outside the Yen credit provided by the Japanese Government and this possibility is being examined.

An other siginificant step recently taken in the establishment of a Shipping Coordination Committee in the Ministry of Transport is to act as a Liaison between the ministries and the other authorities of the Government of India on the one hand and the Shipping Companies in Private and Public Sector on the other so as to ensure full utilisation of the capacity, of Indian ships for the movement of cargoes owned or controlled by Government.

Governments have also accepted the request of the Indian Shipping Companies and have exempted them from the Wealth Tax and the Corporation Tax. Shipping Companies were also already excluded from the obligations imposed by the compulsory Deposit Scheme. Recently it has also been announced that the development rebate of 25% allowed on ships would be enhanced to 40%



A Ship under fitting at the Jetty

Suitable increases in the coastal freight rates both for coal and for general cargo have also been made in pursuance of the recommendations of the Rail-Sea-Coordination Committee.

One of the problems which has to be tackled in connection with the expansion of Indian shipping relates to personnel. Govern-

ment have taken several steps during recent years to ensure a steady flow of qualified and trained personnel for manning Indian ships. The intake of T. S. "Dufferin" which provides training for navigational officers, was increased in 1956 from 50 to 60 per annum. It is now proposed to increase it further to 75 per annum. Likewise, the number of boys to be admitted into the Marine Engineering Training Course started by Government for training Engineering Officers for the Merchant Navy, is proposed to be increased from 50 to 65 from the next course. There is also a proposal to increase the number of boys to be admitted into the Three Ratings Training Establishments *viz.* T. S. 'Bhadra' at Calcutta, T. S. 'Mekhala' at Visakhapatnam and T. E. 'Navlakshi' in Navlakhi. The standard of training in all the institutions is kept up at the highest level according to standards in other countries and the Certificates of Competency issued in India are recognised as equivalent to those issued in the U. K.

The system of recruitment of Seamen at the Ports of Bombay and Calcutta has been placed on a regular and sound footing by the establishment of Seamen's Employment Offices at these two port cities. Recruitment or Seamen through these Employment offices was originally confined to foreign going ships but with effect from 1—9—57, this has been extended to 'Home Trade' ships as well as the port of Bombay.

The three Deck Passenger Committees at Bombay, Calcutta and Madras have been reconstituted. A fresh committee is proposed to be set up shortly for the Nagapattinam port.

Steps are being continued to promote the development of sailing vessels industry. An officer has been appointed in the Directorate-General of Shipping who is expected to be mainly incharge of this work. The new Merchant Shipping Bill has already been introduced in this House and referred to a Joint Committee. As soon as this Bill has been enacted, powers will be available to Government to rehabilitate this industry on a rational basis.

It is universally recognised that the development of our minor ports and the revival and moderanisation of our old ship building industry are inter-linked and inter-dependent. A very high priority is, therefore, being given to this sector of our shipping and shipbuilding industry.

For sometime past the question of setting up an organisation for the maintenance of Ports and Shipping Statisties on a rational and systematic basis had been under active consideration. It has, however, now been decided to make a beginning in this respect immediately in a modest way by setting up a Statistical Cell in Bombay under a Chief Administrative Officer to conduct pilot studies in the first instance.

The measures detailed above are significant in themselves and it can be reasonably hoped that with these and other similar measures that may follow in their wake, the Indian shipping is bound to take rapid strides on the onward march of progress and expansion. The foundations have been well laid but a good deal more has to be done. Even so we can confidently look forward to the day when Indian shipping and shipbuilding industry will once again come into their own and shine at the pinnacle of their pristine glory of which we are all proud even today.

* * *

A provision of Rs. 45 crores is made for shipping in the Second Plan including Rs. 8 crores to meet the orders placed during the first Plan period, and Rs. 20 crores earmarked for direct investment in the Eastern Shipping Corporation.

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TRAVEL AND SHIP BY INDIAN VESSELS AND SERVE THE NATION

DISCOVERY OF NATURAL GAS IN JWALAMUKHI REGION

Recently in the Jwalamukhi region, the first experimental well of the India Government Commission for Oil and Natural Gas yielded natural gas which can be used for industrial purposes.

During the past many years, Indian oil industry has been based on comparatively poor deposits of oil in Assam, and the huge territory of the country lying between the oil-fields of Assam, Burma and West Pakistan was characterised as absolutely devoid of oil and natural gas. This wrong conception was shaken for the first time by the Soviet oil expert, N. A. Kalinin, (who visited India in 1955 in accordance with the Soviet-Indian Agreement on technical aid by the Soviet Union), by discovering new oil and natural gas bearing regions in India. The Jwalamukhi region, famous for its gas streams, was selected as the first region for oil and gas prospecting. This region has been known since ancient times for seepage of gas, and the Zoroastrians, with their cult of fire-worship, built their fire-temple here. This interesting fact was altogether ignored by American, British and French oil specialists, although it is clear to every oil geologist that the seepage of natural gas is a reliable indication of the presence of industrial gas and, often, of oil in the depths of the earth. It is also known that Indian specialists estimated the significance of the peculiarity of the rigion correctly; but they could not substantiate their findings due to lack of experience.

The sincere desire of the Soviet people to help Indian friends in getting their own oil and gas paved the way for successful oil-prospecting in the region. On the recommendation of Soviet experts, who worked in co-operation with Indian geologists, M. N. Ghosh, L. P. Mathur and G. A. Kohli, the site for sinking the first experimental well was chosen in 1956. Drilling operations were assigned to Rumanian drillers, headed by Engineer I. I. Petku. By the beginning of 1958, they reached the depth of 5,500 feet. After electric and neutron analysis of the substances forming part of the different strata of the earth, the Soviet geophysicists gave their suggestions about promising spots for experimental perforation. Test perforations were done and they resulted in the discovery of gas-bearing strata. According to the preliminary estimate of the amount of gas in these strata, a hole of 3 millimetres in diameter can yield 50,000 cu.m. of natural gas. The analysis of the gas has not been concluded yet, but even now one can see that it consists of not only the light gas, methon, but also of heavy gas particles, which testify to the probable existence of oil in the deeper strata. At present, the drilling operations are continuing according to the plan adopted previously.

Drilling operations will soon be started in the Hoshiarpur region. The Soviet, Indian and Rumanian oil specialists are at present doing their best to carry out the task of creating a reliable basis of oil industry in India. ***

The part played by A. E. I. in transport industries all over the world is magnificent.

TRANSPORT: NEW DEVELOPMENTS BY METROVICK-AN A.E.I. COMPANY

The A. E. I.'s already large capacity for the manufacture of railway motors and generators is to be doubled by extending its traction motor works at Sheffield at a cost of £ 2¼ million, and increased capacity is being provided for control equipment. This will enable more export business to be undertaken without prejudice to the substantial assistance available to British Railways in their modernization plan. Work is at present in hand on electric locomotives, Diesel-electric locomotives, and multiple-unit trains, all of which are envisaged in this scheme. Much special equipment is being developed for operation on the new 25-kv 50 c/s single-phase a.c. system adopted by the British Transport Commission. Overseas, electric traction equipment is being supplied to great cities such as Sydney, Rio de Janoiro, Cape Town, Johannesburg and Calcutta to help in solving their traffic problems and give access to the surrounding territory. Main line locomotives have been despatched to Eire, Western Australia, and New South Wales, and nearly two hundred will be in service in those countries by the end of 1957. M-V-GRS signalling equipment has been installed on main lines and marshalling yards from Scotland to Rhodesia.

Many ship propulsion equipments have been in hand-geared steam turbines for large tankers, gas turbines for the American and Italian navies, and combined plant for the Royal Navy. Following the commissioning of the pioneer British Diesel-electric trawler (a

Government research vessel) in 1955, a similar equipment is in hand for a trawler for commercial service.

RAILWAYS

New types of traction equipment are being developed to suit the 25-kv 50-c/s single-phase system adopted by British Railways for their general electrification scheme. These include rectifiers, transformers, on-load tap changers, and switchgear for mounting in electric locomotives and motor coaches, and also signalling apparatus.

The single-anode constantly-excited mercury rectifier known as an 'excitron' is now in production; special features of the M-V design are the low overall height, which is less than 28" and permite underframe mounting, and the use of the ignitron method of ignition, which dispenses with any moving parts in the system. The rectifier transformer will be fitted with 25-kv on-load tap-changing equipment to control the voltage to the traction motors under varying conditions of starting and running; the tap changer is designed to suit the limited space available and other special conditions of railway working.

Electric locomotives

Twenty-four of the forty 3820-h.p. 108-ton Co-Co electric locomotives for the New South Wales Government Railways have been completed at the Stockton Works of Metropolitan-Vickers-Beyer, Peacook; fifteen of them are now in service on the 1500-V d.c. main line electrification from Sydney to Lithgow in the Blue Mountains, these being the most powerful electric locomotives made by a British manufacturer.

Electrical equipment has been despatched for two shunting locomotives being built in Holland by Workspoor for New Consolidated Goldfields. Nine 2500-hp locomotives with M-V electrical equipment are now in service with the Polish Coal Mines Administration.

Fifty-eight cots of rheostatic braking equipment are being supplied for the mixed-traffic locomotives equipped some years ago for the Manchester-Sheffield-Wath electrification of British Railways, and h.v. cab-heating equipment is being supplied for these and for seven high-speed passenger locomotives.

Diesel-electric locomotives

Eight more of the 1105-hp 77½ ton 2-Do-2 Diesel-electric locomotives have been shipped to Western Australia, thus completing the order for forty-eight locomotives for the Government Railways.

A large number of M-V locomotives are now in service with Coras lompair Eireann; all sixty of the 1200-hp 85-ton Co-Co locomotives have been despatched to Dublin, and shipments are about to commence on the thirty-four 550-hp 58-ton Bo-Bo locomotives in hand. Ten out of twelve Sulzer-engined locomotives fitted with M-V electrical equipment are also in service in Eire.

Design work is proceeding on twenty 1200-hp Co-Bo 90-ton locomotives on order for British Railways.

Motor coach stock

Thirty-five of the fifty 1280-hp 3000-V d.c, three-coach train units for the Central Railway of Brazil have been shipped to Rio de Janeiro, and most of these are now in service. They will be followed by fifty motor coaches and the electrical and mechanical equipment for a hundred trailer cars, which with other gear will complete this £ 7,000,000 order.

Almost all of the twenty-four sets of 600-V d.c. electrical equipment being supplied for the Mersey lines of British Railways are now in service. Several of the eighty 1500-v d.c. motor coach equipments for the New South Wales Government Railways are being crected in Sydney. A large number of 3000-V d.c. equipments are also in hand; design work is practically complete on two large orders—a hundred and eleven motor coach and two hundred and forty-four trailer equipment for the South African Railways, and thirty-four motor coach and sixty-eight trailer sets for the Calcutta suburban electrification.

An experimental 25-kv 50-c/s a.c. equipment has been built for testing on the Lancaster-Morecambe-Heysham electrified line of British Railways and is now being erected in the motor coach; this includes four of the special 'excitron' rectifiers mentioned earlier together with rectifier transformers and on-load tap-changing equipment.

Mining locomotives

Two of the seven 90-hp 13½/14-ton flameproof battery locomotives, type DDF 12, ordered for the Haltby colliery of the National Coal Board (East Midlands Division) are now in service, and a further two locomotives are in hand for Rothes colliery (Scottish Division).

Steelworks cars

Electrical equipment has been ordered by Head Wrightson for three 50-ton transfer cars—a scale car for South Durham Steel & Iron, and two sinter cars for Dorman Long.

SIGNALLING

A new mechanized marshalling yard has been brought into service by British Railways (Scottish Region) at Thornton in East Fife. M-V-GRS supplied the retarders and automatic point equipment for this yard, which is the first in the country to use fully automatic braking of wagons and electronic methods of speed measurement; it is the forerunner of many more to be designed by British Railways. Automatic or manual control of both the retarders and points is provided, and all control switches for these and for the signalling are combined on one panel.

A large type NX signalling plant involving one large and one small control panel at adjacent stations is being installed at Temple Mills (Eastern Region).

Two large installations of centralized traffic control have been ordered from Rhodesia, one covering 83 miles between Thomson Junction and Livingstone and the other 51 miles between Livingstone and Zimba; the former equipment is due for erection in 1957. Three type NX interlocking plants have been ordered by South African Railways for installation between Knights and Kempton Park near Johannesburg, and in one of these 'Syncrostop' equipment will be used for Small remote interlocking. The first small power signalling installation has been ordered by the Pakistan Government Railways.

A first installation of power-operated road crossing barriers has been put into service at a steelworks in this country.

For the automatic train control system to be used on British Railways a large number of track inductors have been made and installed on the trial section between Kings Cross and Granttham; other devices are being developed for this system in conjunction with the railway engineers.

A new line of relays, type AS, has been developed and is now in production; this relay, which is of the plug-in type, very similar to the well-known type B range and with all its plugboard facilities, follows the modern trend towards 'miniaturization'. The application of electronic devices on which development work has been proceeding during the year is to be extended.

Signalling apparatus is being developed in cooperation with British Railways engineers for use on their 25-kV single-phase 50-c/s a.c. electrifications.

ROADS

Trolleybuses

The new equipments developed for Manchester have been giving excellent service since they were commissioned about a year ago, and eight equipmants supplied through British United Transport to Ashton-under-Lyne are now in service. Sixty equipments for Glasgow Corporation are also in hand, fifty for double-deck buses and ten for single-deckers.

Tramcars

The first of twenty-nine-equipments for the Rotterdar Electric Tramways is in Service.

SHIPS

Propulsion equipment

A 7300/8200-s. hp geared steam turbine and also two 350-kw d.c. auxiliary turbine-generators have been put into service aboard the oil tanker Vivien Louise, built by Furness Shipbuilding for British Oil Shipping.

Geared propulsion turbines together with auxiliary turbine-generator sets have been ordered recently by Furness Shipbuilding for seven more oil tankers. Five of these vessels will each be equipped with a 7300/8200-s.hp geared turbine and two 350-kw d.c. auxiliary turbine-generators; the two larger tankers will have 12 500/13 750-s.hp propulsion units and 550-kw auxiliary sets.

Two 4500-s.hp *gas turbine* engines for boost propulsion have been delivered to the United States Naval Shipyard, Philadelphia, for installation in a U. S. Navy experimental coastal craft. These engines are similar to the engines installed in H. M S. Bold Pathfinder and Bold Pioneer.

The first of two experimental 5000-s.hp gas turbine boost units for the Royal Navy has carried out initial shore trials, and a similar engine ordered by M-V licensees (Nuove Reggiane) for the Italian Navy is nearing completion. This is a new design offering greater economy of operation.

Early in the year orders were received from the Royal Navy for combined steam and gas turbine propulsion plant of an entirely new type for frigates and destroyers. This system employs steam turbines and gas turbines geared to the same propeller shaft: thus the gas turbines, which offer a high concentration of power in a very compact form, can be used to boost the speed for extended bursts.

Complete Diesel-electrical equipment is in hand for a 1500-s.hp trawler being built by Cook, Welton & Commell at Hull; this vessel, which is intended for Icelandic fisheries will be commissioned in 1957. The equipment includes a 1500-s.hp 175-rpm double-unit propulsion motor supplied from four 330-kW d.c. generators, each with a belt-driven amplidyme exciter; contral can be from either bridge or engine-room. A 300-hp motor drives the trawl winch and can be connected to any of the four main generaters. Domestic and excitation requirements are supplied by four 65-kW tandem-driven generators. All the engine-room auxiliary motors, starters and switchboard are being supplied by M-V.

Diesel-electric machinery has been ordered for the new Sandbanks chain ferry, which will ply between Bournemouth and Swanage. This ferry, which is being built by J. Bolson of Poale, will be driven by a 110-b.hp geared motor supplied from to 40-kW Diesel-driven generators connected in series; each of three main generators (one a standby) will be coupled in tandem with a 30-kW auxiliary generator for supplying power to the 18-hp geared prow motor. The ferry will operate on the modified Ward-Leonard system and can be controlled from either end or from the engine room.

Dredgers

Diesel-electric equipment has been supplied for a.c. propulsion and winch drive on the Malayan tin dredger Paula and also for the bucket dredger Hermes, which is about to be commissioned for J. & K. Smit of Rotterdam. (This is a sister ship to the Hercules, which was equipped four years ago). Equipment is in hand for the Laconfield, a bucket dredger being built by L. Smit in Canada.

Diesel-electric equipment is also in hand for a suction sand dredger being built by P. K. Harris for operation on the South Coast; two Diesel-generator sets will supply a 500-s.hp propulsion motor, the suction pump motor, and the auxiliaries.

Auxiliary equipment

Auxiliary d.c. turbine-generator sets rated at 350-kW have been commissioned in the Furness Shipbuilding oil tanker Vivien Louise, and 350-kW and 550-kW sets have been ordered by the same builders (as mentioned earlier). Auxiliary equipment is also being supplied in connection with the various Diesel-electric and dredging plant in hand. Further orders from Holland for marine generators and motors bring the total in hand to eighty generators from 0.75 to 230 kW and sixteen motors from 8 to 30 hp.

Much switchgear is involved in many of these marine applications, for instance a.c. propulsion and auxiliary controls for a dredger propelled by slipring motors through fluid couplings, and switchboards for oil drilling barges and for ships' control panels.

Remote-controlled motor-operated water-tight doors are being supplied to three Alfred Holt Ships being built by Vickers-Armstrongs.

* * *

The following table gives comparative figures of total railway route mileage, total electrified route mileage and the electrified track mileage in 1955 in 35 different countries of the world.

Country		*Total Route Mileage*	*Electrified Route*	*Electrified Track in*
Algeria	...	2,828	193	242
Argentina	...	27,273	88	209
Australia	...	26,562	398	977
Austria	...	3,757	922	1,969
Belgian Congo	...	3,250	130	1,665
Belgium	...	3,063	312	859
Bolivia	...	1,734	6	9
Brazil	...	23,100	1,433	N.A.
Canada	...	43,132	31	87
Chile	...	5,104	279	456
Costa Rica	...	411	94	100
Cuba	...	2,840	144	260
Czechoslovakia	...	8,304	275	544
Denmark	...	2,239	37	81
France	...	25,223	3,090	5,881
Germany (West)	...	22,878	1,326	3,501
Great Britain	...	19,470	1,172	3,158
Holland	...	1,975	828	1,989
Hungary	...	5,029	231	659
India	...	34,705	240	579
Indonesia	...	3,727	55	77
Italy	...	11,210	4,297	7,923
Japan	...	14,113	6,618	9,137
Mexico	...	14,498	79	100
Morocco	...	1,090	474	561
New Zealand	...	3,489	71	167
Norway	...	2,768	790	1,044
Poland	...	15,800 (estimated)	65	158
South Africa	...	13,585	861	1,749
Spain	...	8,170 (B. G. only)	1,201	N.A.
Sweden	...	10,063	4,331	6,749
Switzerland	...	3,082	2,953	4,371
Turkey	...	4,849	17	35
U.S.S.R.	...	74,753	3,430	N.A.
U.S.A.	...	221,666	2,044	5,368

Goetze - India products have won a lasting reputation for quality, precision and admirable utility. They save and earn the much needed foreign exchange for our country.

MODERN PISTON RING & SLEEVE PLANT OF GOETZE-INDIA

It was with an overwhelming desire, first to contribute to the economic development and prosperity of the country and, secondly to supply components to indigenous manufacturers of internal combustion engines for automobile and industrial applications that Goetze (India) Private Ltd., set up a factory at Bahadurgarh, near Patiala, in collaboration with the renowned Goetzeworke Friedrich Goetze A.G., Burscheid, B-Köln, BZ. Düsseldorf, West Germany, for manufacturing piston rings and sleeves.

A piston ring, which looks very simple, is a precision article. Its function in an engine can be compared to that of a heart of a human being. No other part in an internal combustion engine is subject more to heavy work than the piston ring. The pressure inside the cylinder caused by explosion in an automobile engine is approximately 30 tc 40 kilos per square centimeter, and in diesel engines it goes up to 80 kilos. Due to the high temperature of 1900° C to 2000° C in the explosion chamber, the top ring of a heavy duty engine is subject to a constant temperature of 250° C to 300° C. The constant change of piston speed from 10 to 20 meters per second in high speed engine causes continuous shock by the shift of stroke and pressure resulting from friction pressure and mass power. Due to the sliding or oscillation of the rings and friction under pressure in radial direction, the rings are subject to heavy strain resulting in wear and injuries to piston grooves.

In the above exacting conditions, the function of a piston ring is to seal the combustion chamber from the crankcase under high temperature and pressure at a comparatively higher speed and poor lubrication without losing its tension, changing shape and wearing fast. Besides, it has to transfer heat, return

lubricating oil to the crankcase, prevent oil burning in the combustion chamber and adapt itself to distorted cylinders.

The production of such an important and high precision article is not only complicated but calls for proper equipment and highest degree of foundry and machine shop skill. Before the required properties can be imparted to a piston ring in its manufacture, a number of conditions must be fulfilled in the foundry and machine shop. They are :—

1. The rings must be individually cast to have a definite, highly uniform grain structure and possess good elasticity.
2. The texture of modulous of elasticity must be constant not only between individual rings and complete batches but also over long periods of time.

These can only be achieved by careful regulation of heat and maintenance of constant temperature during melt, strict control over chemical composition, moulding and casting operations.

The desired quality of blank rings cannot be cast by following the conventional means and methods. To regulate and maintain the desired temperatures during melt, a low induction electric furnace of 1.5 ton capacity, specially got manufactured in Germany to suit the conditions, has been installed.

To control the consistent quality of castings in mass production, the foundry had not only to be equipped with a most up-to-date laboratory for metallurgical and chemical analysis but also completely mechanised with moulding machines, sand preparation plant and underground roller and overhead conveyor systems. Before the cast rings are sent for machining, they are cleaned for sand and other impurities by modern cleaning machines.

To produce rings possessing the superior quality of consistency, shape and elastic behaviour with the desired specific radial pressure distribution, thus leaving the natural tension of the rings unimpaired, special machines developed by Messrs. Goetzewerke after years of experimentation, have been installed together with a de-dusting plant to keep the tool tips cool and obtain better finish and tolerances and at the same time keep the machines and atmosphere in the factory clean and healthy.

To ensure the desired precision in a finished ring upto 1/1000th of a millimeter, special automatic machines have been installed for inspection of width and cutting the gap in addition to various conventional testing equipment.

At each step of production the rings are inspected for defects and only the best are passed from one stage of production to another until final inspection, thus ensuring that only quality products go out of the factory.

Another additional advantage is the installation of the most modern hard chromium and tin plating plants the first of its kind in this country.

For producing cylinder liners centrifugal casting machines have been installed.

The installed capacity of the plant is 4½ million rings and 30,000 sleeves per year, capable of taking care of not only the country's present requirements but also the needs of neighbouring countries, thus saving and earning the much needed foreign exchange for the country.

Although most of the equipment and machines are of the latest and automatic type, they cannot by themselves produce quality rings. It was, therefore, necessary to employ expert German technicians who could supervise the production of quality rings in this factory and at the same time train Indian personnel during their stay here. In addition to the German experts, young qualified Indian engineers were sent to Germany for extensive training and specialization in various departments who are now working in the factory and training other personnel in turn.

The quality of rings has been approved and used as original equipment by many engine builders in the country since the factory began commercial production a few months ago.

EXPANDED RUBBER

The history of the invention and commercial development, after patient and pioneering research, of a remarkable industrial product is narrated in *The Story of Expanded Rubber*, published by the Croydon (London) manufacturer of the product.

The story starts with the tireless investigations of three Austrian brothers named Pfleumer, who were searching—in the early years of this century—for a puncture-proof tyre. They began by making an expanded rubber composition.

Their work was taken up by Charles Marshall in England, who saw the potentialities of the material in other fields and began to develop both the ebonite and soft types of expanded rubber. In about 1921 another scientist Dr. D. Griffiths, of the National Physical Laboratory, saw the possibilities of the material for thermal insulation, which today is its principal application.

Marshall's firm underwent many changes as research work into this promising material continued. When war broke out in 1939, reconstruction had already started under the present managing director of the Croydon firm.

The first large contract was to supply expanded rubber for buoyancy purposes in carrying harbour defences. An example was the manufacture of soft expanded rubber for self-sealing fuel tanks for aircraft—leaking petrol caused rubber in the casing to swell and plug the hole.

The fall of Malaya posed an exacting question: how could the products be maintained with a reduced rubber content?

Later, the company was acquired by a plastics firm, and research into expanded plastics was stepped up. By the time the war was over, practically all commercial plastics had been expanded, and three of these were commercially very successful.

Wide Range of Products

Today the company's products range far beyond the dreams of the early experimenters. Expanded rubber has gained the reputation of being the best insulation material in the world, and is used by leading chemical companies, ice-cream makers, in cold-store construction, frozen food cabinets, and in all kinds of refrigerated transport. It has exceptionally low thermal conductivity and low water absorption.

High-grade packing materials, such as shock pads to prevent damage to instruments in transit, are also important products today.

In looking back over the past, this detailed review of a vital industrial product concludes that today it must seem to man like the Pfleumer brothers to have been a worth-while struggle as they see that from their obscure inventions and unrewarded research has emerged a new branch of the rubber industry.

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